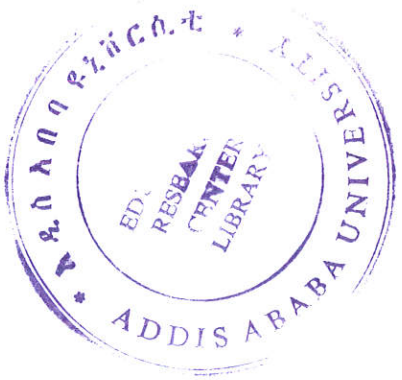
ADDIS ABABA UNIVERSITY
School of Graduate Studies

The Implementation of Problem Solving Approach in the Context of Rural Primary Schools in Oromia Region: the Case of Adami Tulu Judo Kombolcha Woreda

By
Solomon Belay Faris



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The Implementation of Problem Solving Approach in the Context of Rural Primary Schools in Oromia Region: the Case of Adami Tulu Judo Kombolcha Woreda

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Approval of Board of Examination

Chairman, Department Graduate Committee	Signature
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Dedicated to

my dearly loved father Belay Faris in the Abha kingdom

who always wanted me to learn and to succeed.

Abstract

It has been about ten years since the government of Ethiopia made a new educational and training policy. The making of the policy has been followed by the development and implementation of different programs in order to carry forward the innovations enshrined in it. One of the highly emphasized aspects of this policy is the need to implement a problem solving education both in content and approach with the objective of producing a problem solving citizen. Related with this, the more elaborate aspiration of the policy is the trend towards shifting classroom instructions from teacher-centered approach to a student-centered approach. Though a variety of understanding exist on what 'a student-centered approach' means, the problem solving approach with its qualifications as a student-centered approach and its unquestioned relevance in the development of problem solving citizen, it is expected that this approach is given precedence in the implementation of the policy.

This particular study had, as its starting point, a supposition that in fact problem solving approach/process are teachable and the capacity to solve problems can be developed in school children. It is also assumed that efforts are being made to implement this approach at all levels of the educational system of the country. Owing to the realization that the country's largest population lives in the rural areas and the priority given to agriculture led economic development, the research focused its attention to finding out how the problem solving approach is being implemented in rural primary schools. The bulk of primary school leavers constitute the young work force in the rural areas: therefore the study narrowed its focus on eighth grade students.

This case study conducted to examine the implementation of problem solving approach, took 48 classroom observations in eight rural primary schools as central to the data collection process. However, in order to increase the validity of the research and with the intention of describing more what has been taking place in the classroom interactions, the main elements of the interactions have been identified and used as source of data. These main elements included; 152 teachers, 160 students, 8 principals, eighth grade text books and school facilities. The sampling procedure and

instruments of data collection were such that each category of elements is represented in a way they balance representation and depth and detail.

Though our daily life is full of problem solving, the scientifically accepted steps/process of problem solving approach were identified and their implementation was assessed in a way applicable to each source of data. Accordingly the data obtained from each source with the particular instrument of data collection were organized and analyzed under certain themes pertinent to the process of problem solving

The study revealed that problem solving approach is not being implemented in classroom instructions. Teachers either have no any training or are poorly trained to implement problem solving approach. Text books and school facilities are not in favor of the implementation of problem solving approach. Rural primary schools are under the gnawing influence of the vicious circle of poverty and low quality education. Therefore, stated in a very general sense, one can conclude that the implementation of problem solving approach in rural primary schools is in its embryonic stage. It is not born, being cared and developed. By extension of the implication of the process to the end, one also can say that primary school leavers didn't have the capacity of problem solving. Students rather are found to develop dependency syndrome and highly influenced by the information they acquire from sources other than their formal education.

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Abbreviations

ETP	Education and Training Policy
MOE	Ministry of Education
PSA	Problem Solving Approach
TTI	Teacher Training Institution

Acknowledgement

If I was not 'assured that no tongue, however deep its wisdom, can befittingly magnify His name, nor can the bird of the human heart, however great its longing, ever hope to ascend into the heaven of His majesty and knowledge', I would have devoted pages and pages in praising the Lord God for all what He has bestowed on me.

Therefore, the first sincere thanks and appreciation goes to my instructor and advisor Dr. Teshome Nekatibeb for making the study possible in its entirety. Retrospectively, I loved his challenges as I ultimately believed that he instilled in me the spirit of hard work and patience beyond the rigors and skills of research. He summarized for me the pain and pleasure of acquiring knowledge for which all my instructors were pouring their loving effort.

What amount of gratitude suffices for the continuous nurturing of my Mom, W/ro Bezawork Tsega, even as I do my masters degree in my late thirties!? Of course, I know Mom will let my sisters and brothers (especially Zinash) share in this feeling of gratitude.

If the award from the University could be transferred to one dearly loved mate, I would unhesitatingly proffer it to my wife Eshet Assefa as she has shouldered the toughest part of the brunt in the last two years of schooling.

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I owe Yenu and Tizu a debt of gratitude for the sustained encouragement they gave me. Another row of thanks go to Mitikneh, Aziti, Solomon Woldetinsay, my neighbors, the many Baha'i friends who have been praying and encouraging, the many wonderful souls who warmly welcomed me at Ziway and all the primary schools at the research site.

Chapter One

1.1. Background of the Study

Issues of rural development have been in the development agenda in the last few decades. However, currently one can say that interest in rural development has grown more than ever. It can be succinctly stated that the present interest in research of the problems of rural development is the assumption, heard lately with increasing frequency, that a prior condition for any development is an accelerated development of the agricultural sector (Arbab, 2000; Weitz, 1971). This assumption has led many, including Ethiopia, to reconsider the hierarchy of priorities in development programs and to place an ever increasing emphasis on the development of agriculture and the rural regions (IDS, 2002). Despite the lack of agreement in the definitions and indicators of development, many seem to agree on the fact that economic growth in the early stages of the process of development apparently depended on the possibilities latent in the agriculture sector (Weitz, 1971).

This assumption led to the opening of more schools in the rural area with the intention of having a trained mind in the farms. The Ethiopian government itself is working towards achieving universal primary education by the year 2015 (MOE, 2002). More particularly, the education policy aims at expanding educational services in the rural areas of Ethiopia. Congruent with this, interest in formal education has increased in rural areas as rural people started to look education as a means to a better life (Daniel, 2003).

However, the channeling of educational efforts in to development endeavors, particularly rural development, seems very far from being achieved. Let alone achieving balanced development goals at the rural areas, the traditionally pursued goals could not be maintained (Daniel, 2003). There seems to exist little link between subject based curriculum to corresponding changes in the labor market, job opportunities, the transition between school and work, and thereby to the occupational aspirations of students which influence their motivation, discipline and school attendance (Elliott, 1986).

Arbab (2000) states that a dual cry can be everywhere heard rising from the heart of the great masses of humanity of whom the majority live in the rural areas of the world. It demands the extension of the fruits of material progress to all peoples and, at the same time, it calls out for the values of spiritual (culture based) civilization. The contention that formal education causes unemployment or underemployment or questions in terms of the appropriateness of investment in education seems valid (Blaug, 1980; Simmons, 1980). Teshome (1998) has indicated that there is a change in faith in education in some rural communities because of the large number of unemployed youth who return home after secondary schooling. Daniel (2003) for example stated that the longer time the children spend on formal education the less they spend time learning the skills, values and beliefs that they require to function in their own social and economic context.

When we also examine closely the situation in Ethiopia, once thought to be rich in its natural resources, we find that it is suffering with many kinds of environmental problems: deforestation, overgrazing, soil erosion, water shortages and poor resource management. Average life expectancy for the total population is 43.3 years which is much below many countries (compare with Africa 51.3) (Ayele, 2003). Owing to these environmental problems the word hunger has become synonym with the name Ethiopia.

Aspiring to address these development issues the Ethiopian government has prepared education and training policy that aims to introduce numerous innovations in the education system (ETP, 1994). This policy gave an emphasis to the promotion of problem solving capacity both in the content and approach of education. From this it can be understood that development is conceived as increasing the capacity of people to solve the 'economic, social and political' problems of the country (MOE, 2002:15) their problems. In a way it is putting in place a development process that aims to use formal education as a strategy.

As the government tries to establish systems and furnish resources to promote problem solving education through problem solving approach, few researches are being made that assist the refinement of the policy implementation. For example Daniel (2003), studied

some implications of the interaction of formal education with an Ethiopian rural community. After the analysis he made on the worldview and values underlying formal education versus that of the rural community and their implications on the social and economic life of the people he concluded that the worldview and value systems of formal education and the community are in opposition. And, as a result, he questions the presence and relevance of formal education to the rural community.

Moreover Desta (2001) in his master's thesis urged that further research should be done in the problem solving statue of the education policy as he found out that there are problems of facilities and teachers' training to implement problem solving approach.

Therefore there comes the need to have further research on the curriculum and instruction being implemented in rural schools in terms of their capacity to equip students with problem solving capacity. This research has set out to see to it that to what extent our rural schools have become successful in implementing a problem solving approach and develop people with the capacity of problem solving.

1.2. Statement of the Problem

The present researcher has the belief that research should be integrated with social action (Solomon, 2003). Therefore, such a research has to be done with the idea of discovering the challenges and prospects of rural schools in changing the lives of rural communities. Based on some studies (Ayele, 2003) and personal experiences it is a well known fact that many of Ethiopian rural communities are leading a depressing material life. These observations by themselves motivate to the designing and implementation of proper education that address both the physical and metaphysical aspects of rural people. As will be discussed in chapter two problem solving approach in education is one such proper approach.

The word problem indicates that there is a perceived gap between what is wanted and what is available and problem-solving refers to the process of finding or constructing a solution in reducing or eliminating this gap (Opwis, 1994). When a country sets an

educational policy which is problem solving, it means that problems are perceived and there is a plan to use education and training as a strategy to equip citizens with the capacity to solve them. It can be also assumed that when the government of Ethiopia proposes that the agriculture sector to lead the development process it means that priority is given to finding solutions to the problems of the rural people which is logical in many ways (IDS, 1994). These assumptions and strategies require that we make sure a problem solving education is implemented, as indicated in the policy, both in content and approach in rural primary schools whose graduate will later constitute the major enlightened work force of rural area.

Therefore this research will describe how problem solving approach is being implemented in classroom instructions and what has happened to students as a result of this same instruction. It moreover elucidates the opportunities and the challenges that exist in rural primary schools as problem solving approach is being implemented.

1.3. Research Questions

More categorically, this research answers the following basic questions in relation to the implementation of problem solving approach and suggests few recommendations based on the answers:

1. What does the profile of the teachers, the students and the schools look like that make situations favorable in the implementation of problem solving approach?
2. How are classroom instructions (interactions) going on in rural primary schools vis-à-vis the problem solving approach?
   - 2.1. What does the knowledge of the students look like in relation to the process of problem solving if they are being instructed with the approach?
   - 2.2. What does the attitude of the students look like on problems and problem solving if they are being instructed with the approach?
3. What is the extent of understanding of the concept of problem solving approach mentioned in the education and training policy in the part of teachers and principals?

4. What are the opportunities for and challenges of teachers and principals in implementing problem solving approach in rural primary schools?
5. What can be done to augment the implementation of problem solving approach in rural primary schools?

1.4. Significance of the Study

Despite new policies being formulated and implemented, rural poverty seems to grow due to many factors. Rural to urban migration, where the 'cores' absorb the 'peripheries', is increasing (Chambers, 1983; Ayele, 2003). Educated rural youth don't remain at their localities to face problems and challenges of their village communities and solve them in collaboration with the community after they finished schooling while urban educated people are hesitant to go to the rural areas to serve the people.

Many claim the source of these problems to be our educational system itself, where children don't get an education based on their own cultural values that help them for critical thinking and problem solving (Daniel, 2003; Amare, 1998). Tishman et al (1995) admit that schools are places of culture not only in the sense that they introduce students to great intellectual achievements, but also in their sense of community, their spirit of common enterprise as an extension of their families.

When we talk of a culture based instruction we could also be talking of a classroom culture of thinking that refers to a classroom environment in which several forces-language, values, expectations, and habits – work together to express and reinforce the enterprise of good thinking and problem solving. If we are to implement problem solving approach in classrooms we are creating students that are thoughtful, inquiring, and imaginative (Ibid, 1995). They start to inquire why things happen as they are now; they imagine a different approach and methods of doing things that are fundamental to development processes. Therefore a research of this kind helps curriculum experts and teachers to set an objective, content, method and evaluation for classroom instruction through problem solving approach.

The finding in the valuation of the status of students in terms of their knowledge and attitude of problem solving is indicative of what remains to be done at all levels of the policy making and implementation. Moreover it points out the direction to be taken to create nexus among classroom instructions, research and development (as aimed by the ETP, 1994) that will be helpful for teachers and local communities.

Moreover, it has been about ten years since the Ethiopian education and training policy has been in place. An evaluative research to see how far the policy has been successful is essential. This research is supposed to serve the purpose, in its own way, what Nisbet (1994) expounded on the importance of having policy oriented research. Nisbet stated that research in education needs to be designed, managed and reported with the specific purpose of informing a policy decision, or assisting or monitoring its implementation or evaluate its effects.

Beyond the significance enumerated above, the study is also relevant with respect to depicting how far our schools implement problem solving approach per se as an innovative method of instruction.

1.5. Scope of the Study

The research has taken as a focus rural primary schools alone. The schools are found in rural villages and some very small 'towns' (semi-rural) which get life during market days. Out of all the primary schools in the particular sample Woreda the primary schools which have eighth grades are the ones included in the study.

The research limited itself to aspects of knowledge and attitude aspects of students rather than skill as they occur at primary school level. It doesn't also include the knowledge and attitude students acquire beyond primary school level. It is possible that the trend in the knowledge and attitude of problem solving could change as they go to higher levels, which is a subject for other research. (The logic behind some of the focuses will be discussed in Chapter Three).

The research used as a source of data the central actors around classroom instruction, as problem solving approach is a process that takes place making classroom at the center. Therefore the study treated teachers, students, classrooms, text books and principals only.

1.6. Limitations of the Study

A viable curriculum and instruction must address all aspects of knowledge, skill and attitude. In assessing the implementation of the educational policy all the three domains should have been addressed. However, due to time and resource limitations this study has focused on the domains of knowledge and attitude excluding skill. If it was not again for the same limitations the views of supervisors and curriculum experts on these same domains should have been included as a source of data.

School principals hold key positions in the process of implementing much of the innovations enshrined in the educational policy. They can give balanced information on the different factors affecting implementation both from administrative and academic aspects. However, many of them seem to lack confidence in whatever they say as they feel they might lose their positions due to what they spoke. Getting the principals express their feelings openly has been a difficult process. One principal was not even willing to be tape recorded.

The working and instructional language of the sample Woreda is Oromiffa. Translations may not sometimes convey what was intended in the original language. Therefore, in order to ensure correct translations of students' questionnaire, able translators have been involved in its development and administration. Back translations have been also used wherever necessary to increase the accuracy of translations.

The largest portion of the questions in the teachers and students' questionnaires consist of open-ended questions. Despite the low writing skill of many of the students and some teachers the data found in this respect was detailed enough to know their responses for the questions. Sometimes the illegibility of students' hand writing demanded an extra effort in managing the data.

1.7. Operational Definitions of Concepts

1.7.1. Problem: The word problem indicates that there is a perceived gap between what is wanted and what is available

1.7.2. Problem Solving: Problem solving is basically a search process consisted of the application of a sequence of operators to the given state to the desired goal (Opwis, 1994).

1.7.3. Rural community: A typical rural community is characterized by some fundamental traits like self-sufficiency, bounded by a small territory, and cultural homogeneity. There is a general consensus of beliefs, outlook, moral values, and behavior. It is a place where everyone knew everyone else (Mendras, 1971).

1.7.4. Education: is a means by which individuals' perfections/potentials can be developed so as to solve their problems.

1.7.5. Curriculum: "A curriculum is an organized set of formal educational and/or training intentions." (Pratt, 1980)

Chapter Two

2. Review of Related Literature

2.1. Introduction

Though every nation and people could possibly have a particular ideology on what it wants to do with education, there seems to exist a universally accepted goal for education. Pratt (1980) for example states that a society's most valuable resource is its people; education is a process by which society invests in the development of its people. Durkheim (1956) puts the development in each individual the perfections of which he is capable, as the main objective of education. Friere (1970) considers education as an exclusive human endeavor having the objective of perfecting themselves.

Education in most cases has been taken as an instrument to reveal the potentials latent in human beings. Baha'u'llah (1972) elaborated the key role education plays in the life of humankind. He urges to regard man as a mine rich in gems of inestimable value, and adds that 'education can, alone, cause it to reveal its treasures, and enable mankind to benefit therefrom'. Mayer (1992) by way of putting the development of the capacity of problem solving in people as a major goal of education, states that in education students have to be helped to become more effective problem solvers, that is, people who can generate useful and original solutions when they are confronted with problems they have never seen before.

Based on such philosophies of education a country makes a policy to guide all endeavors in the realization of its educational vision. Once a policy is set the development of curriculum and instructional approaches continues based on the policy. The following is an attempt of a review of related literature on the background of the Ethiopian educational policy including problem solving approach as one of its innovations, the meaning and implications of the approach and its place in instructional processes.

2.2. Educational Policy and Practice

2.2.1. Policy

A policy in general is a plan of action or a statement of ideals proposed or adopted by a government, a political party, etc (Hornby, 1995). Selashi (2001) states that a policy is 'a position or stance' developed in response to a problem or issue directed towards a particular objective. An educational policy is a statement intended to facilitate purpose, goal or achievement in the areas of education and entails the materialization of goals and objectives by institutions, teachers and all stakeholders (Selashi, 2001). It is a plan of action or a statement of ideals a government outlines to guide the process of education in the country.

Bell and Raffe (1994) identify three phases of the policy cycle in order to assist any researcher frame his/her theoretical guidelines:

2.2.1.1. Recognition of a problem and shaping a policy

All policymakers have certain reasons to formulate a new policy as the process of making it takes a lot of resource and pain. Cuban (1991) lists the following as important reasons to formulate a new policy; the systematic study of change overtime, the recapturing of alternatives that were forgotten by earlier generations of policymakers, and the careful examination of complex organizational structures, processes and values in the past. One can certainly speak of the adoption, adaptation or creation of a new policy influences the way it is going to be implemented. Particularly what happens with education policies have direct impact on schools and classroom routine practices, most of all on children (Cuban 1991).

2.2.1.2. Implementing a policy

Policy implementation is decision making, resource control, and a political nexus to bring into effect what has been in the design. Citing Michael (1991:65), Selashi (2001) states that implementing a policy is the process of putting an idea,

program or set of activities and structures new to the people into practice with the attempt or expectation to make change.

Taking implementation of an educational policy into consideration it can be said that once the policy is formulated, a whole lot of changes in the system of education sets in. Expounding on this, Bickel (1987) says that a growing number of educators and policymakers now subscribe to the view that effective implementation of educational policy is characterized by a desire to create strong educational administration, an orderly school environment, commitment to rigorous academic standards, high expectations for students' performance, and regular assessment of student learning.

A policy is at risk when it is ineffectively implemented or is supported by inadequate information. Leslie and Routh (1991) state that focusing on policy implementation is perhaps the most promising and meaningful way to enhance discussions, cooperation, and understanding.

It is expected that there exist certain factors affecting, positively or negatively, implementation process. Havelock and Huberman (1977) discussing the numerous and serious problems encountering implementation list the following as outstanding ones: strong leadership, insufficiencies in equipment, materials, trained personnel and facilities, resistance, previous training/orientation, problems of coordination, delays, confusion and too rapid implementation. It is hoped that this particular research will find out which of the factors are more influential in the Ethiopian context.

2.2.1.3. Evaluating the outcomes and reshaping the policy

Petrie (1987) discussing the importance of evaluating policy states that it would not be too much of an exaggeration to say that evaluation has become the engine for implementing educational policy. The only close competitor would be curricular and instructional mandates, and even then evaluation is necessary in

order to determine if and to what extent mandates are being carried out. Petrie sees the advantage of evaluation in their promise to begin the necessary work associated with the development of new instruments and approaches, if the existing approaches seem inadequate.

Leslie and Routh (1991) say that it is important for policy related research to serve a feed back function that informs the policy-system at all levels. They state that this is a very sophisticated function that requires deep and concrete knowledge of how the system of implementation works at all levels as well as how all the parts are connected.

2.2.2. The Ethiopian Education and Training Policy

Following the political/government change in the country in 1991, policymakers felt the need to restructure education in Ethiopia through a new education and training policy. As Tekeste (1990) says the question of reform was being confronted more vigorously and consistently. It was pointed out that 'a comprehensive educational policy and direction that replace the old inequitable, undemocratic and *non-problem solving*[1] educational system is a categorical necessity' (MOE, 2002)

The world itself is in rapid and twin processes of integration and disintegration that force changes in all aspects of human endeavor. In the world at large, beyond the different needs that oblige changes the forces of 'globalization, privatization, decentralization and choice' are becoming the causes for restructuring in education (Daun, 1996). Almost all nations of the world are in a state of creating and formulating new policies and restructuring education. When we critically examine the objective situation in the country all these forces were/are at work: so it could possibly be argued that the process of formulating and implementing the new educational policy in Ethiopia is based on the needs of the society and is part of the global changes currently taking place (The Education and Training Policy and Its Implementation, 2002, pp. 4-7).

[1] Emphasis mine. If the old educational system is critiqued to be non problem solving, it means that effort will be made to make the new educational system problem solving.

Responding to some accusations that the policy formulation was not democratic, the Ministry of Education in a document issued in February 2002 argues that the process of formulation of the policy to some extent was transparent, participatory and democratic. It is stated that twenty-two government institutions and sixty-two experts from Addis Ababa University served in various committees and contributed to the drafting of the policy.

The same document restated the objective of the policy in retrospect by saying;

> The aim of the study was to formulate a comprehensive and coherent education policy that would be in the service of development and democracy, to assess the problems of modern education in Ethiopia, to recommend solutions, and to broadly analyze all education related issues. (pp. 4)

Following a brief discussion on the salient features of the education policy is in order.

2.2.2.1. Why a new educational policy

Based on the above premises it is not surprising that the Ethiopian government formulated a new Education and Training Policy for the country. The introductory part of the policy actually explains this fact briefly (ETP, 1994):

> Education, as a very important factor to human development, is of a high priority in the overall development endeavor of the government. Hence, it requires an appropriate direction to set a new process in motion and change the alarming situation. For this, a comprehensive education and training policy is formulated.(pp. 4)

2.2.2.2. Innovations in the content of the policy

When summarizing the requirements of impact in innovation, the Australian Karmel Report (Karmel, 1973) states that the effectiveness of innovation is dependent on the extent to which the people concerned perceive a problem, are knowledgeable about a range of alternative solutions and feel themselves to be in a congenial climate.

The Ethiopian government claims that it perceived problems of access, equity, efficiency, quality and relevance in the area of education and prepared the policy (1994) in such a way that it addresses these problems. It also felt that it is time to do something about the issues at stake.

A. The policy has clearly stated five general and fifteen specific objectives. The objectives discuss major issues like:
   - *Development of the problem-solving capacity of individuals*,
   - Development of scientific and democratic citizens,
   - Integrating education, research and development,
   - Recognizing the contribution of women,
   - Equal access for general education to all children in Ethiopia, etc

B. Curriculum preparation and implementation

The preparation of the curriculum is based on the stated objectives. It intends to involve teachers in the preparation, implementation and evaluation of the curriculum. Text books are planned to be prepared at central and regional levels and the curriculum is thought to foster appropriate relation among the various levels of education, training, research, development and societal needs maintaining the required standards.

Changes were made in educational structures, educational measurement and examination, teachers profile with respect to assignment, languages and education. Emphasis was also given to the creation of nexus between education, training, research and development, augmenting educational support input. Areas of special attention and action priority were delineated.

C. Teaching Methods

It has also been clearly stated that the current educational system employs more of student centered teaching approaches rather than teacher-centered teaching-learning approach which has a wider implication in the development of

curriculum and training of teachers. The unique feature of this policy is that it gave a wider latitude for experiments at regional and school level for a variety of approach which should be 'result oriented.'

2.2.3. The Education Policy and the Problem Solving Approach

Development in this policy is seemed to be conceived as increasing the capacity of citizens to solve their problems. Therefore the education system is expected to employ a problem solving approach both in its form and content:

> It (the policy) emphasizes the development of problem solving capacity and culture in the content of education, curriculum, structures and approach, focusing on the acquisition of scientific knowledge and practicum. (MOE, 1994:4)

> The educational policy envisages the creation of a society with humane and democratic values, high problem-solving ability, and capacity to inquire and carry out research and liberate itself from the adverse pressures of Nature. ... The mode of delivery has also been designed to produce students capable of solving problems (MOE 2002)

2.2.4. Implementation of the Education Policy

Many curriculum experts and educators have argued what should be included under the concept of implementation of policy of education (Barr, 1994; Pratt, 1980). However having reviewed some of their works, implementation can be made to include: the preparation of flow chart and syllabus, the development of text books, teachers training and instructional strategies.

In the case of the implementation of the Ethiopian Education and Training Policy three broad issues have been given priority (MOE, 2002);

- Change of curriculum and provision of educational materials and equipment;
- Improvement of the ability and efficacy of teachers;
- Change of the educational structure.

2.2.4.1. The development and implementation of the new curriculum

Curriculum development is the process of deciding what to teach and learn, along with the consideration needed to make such decision (Schubert, 1986). It is an activity that determines how curriculum construction will proceed. The process addresses the questions of who will be involved in curriculum construction and what procedures will be used in this process. Behar (1994) outlining what curriculum implementation means, states that it refers to the planning for and actual use of a curriculum in practice, and concerns the process of putting into effect the curriculum that was produced by construction and development.

The organization and the designing of the curriculum in Ethiopia has been divided in to two branches: General (1-10) and Specialized or Vocational Education (10+). A general Education fulfils the basic educational needs and includes all aspects of learning and prepares the student for pursuing subsequent specialized education. On the other hand, the special or vocational education prepares the student to engage in junior, medium, vocational and higher level education and vocational skills (MOE, 2002).

The preparation of syllabus, flow chart, teacher training materials, the writing of textbooks, mode of classroom delivery, choice of the medium of instruction and the system of assessment were included in the development of the new curriculum. Beginning from 1994 change was introduced each year into two successive grades on trial basis. There was a plan to entirely replace the old educational system by the new one by the year 2003 (MOE 2002).

2.2.4.2. Training of teachers

It is said that 'able teachers, under favorable circumstances, do make an important differences in students' learning' (Goodlad, 1984). Teachers constitute the one single element of schooling most influencing students' learning and can be said that teachers are key factors in the schooling process.

In the Ethiopian Education and Training Policy it was mentioned that the primary reason for the poor quality of education in the past was the training as well as the overall attitude towards teachers (MOE, 2002). In order to correct this 'deplorable situation' profiles that teachers at every level must fit has been determined; teacher training institutions have been strengthened and enriched; and teacher advancement or promotion scales have been set and are under implementation.

2.2.4.3. The Organization of Education

An education system will not succeed in attaining its objective only for changes in the curriculum or in (the method of) teacher training. The organization and management (direction) of the educational system must also be based on democratic principles.

The ETP implementation outlines a strategy for the establishment of boards and committees composed of parents, teachers, community and administration representatives to direct and participate in the training and employment of teachers, budget allocation and implementation etc.

2.2.4.4. Classroom instruction

The curriculum developed and being implemented based on the new education and training policy is supposed to involve student-centered (sometimes called learner-centered) methodologies in its course delivery style.

> Unlike the old educational system, which was teacher-centered and solely conducted (with) by the chalk and talk mode of delivery, the present system is student-centered with emphasis on various exercises, student-teacher interaction, and encouragement of student inquisitiveness (MOE, 2002:29)

2.3. Methods of Teaching

Since problem solving approach is included under 'methods of teaching' it is imperative to discuss a little about the dynamics of teaching.

Teaching is helping students to learn (Callahan and Clark, 1988). It is not merely telling something to a group of listeners, not explaining some topic. Of course, when you are helping students learn, you may engage in telling, explaining, or demonstrating, but one does these only as a means of helping students to learn. In the final analysis one's success as a teacher will be determined by how well the students have learned. In schools teaching is also a matter of seeing to it that students learn certain designated material. This material is the content that makes up the bulk of the curriculum. Ostensibly this material is arranged so as to facilitate learning. It follows up what has been learned before, and prepares the way for what is to come.

Yet in every teaching situation one will be faced with the necessity of selecting from several alternative strategies and tactics the ones most likely to result in the desired learning (Highet, 1977). When the content and methods one selects are appropriate, it is assumed that there will be a high degree of success. It is also said that although pedagogy is based on scientific principles, classroom teaching is more of an art than a science (Ibid, 1977). There are few hard and fast rules one can depend on in specific classroom teaching situations. In fact, in every teaching situation the teaching content, the instructional objectives, the materials of instruction, the teaching procedures, the evaluation techniques and instructional follow ups are basically all the result of subjective judgments.

Callahan and Clark (1988) state that unfortunately, perhaps fortunately, there is no one best method of teaching that will always generate a high degree of pupil learning. Rather, there are any number of strategies, tactics and techniques that may or may not be effective in a particular situation. Strategy refers to a general approach or plan; tactics refer to the methods used to carry out strategies in particular situation: techniques are the procedures used to carry out the tactics. (In this case for example a problem solving

approach is a strategy whereas a project that uses the problem solving approach is a tactic. The problem solving process applied in the methods are the techniques used to implement the methods.)

2.3.1. Inquiry and Discovery Teaching

Though it is time and again stated that there is no best method in teaching, there are certain methods that trigger more students' higher order thinking. The notion that pupil learning is more meaningful, more thorough, and therefore more usable when pupils seek out and discover knowledge, has been held by educational theorists for centuries (Callahan and Clark, 1988). Many practitioners today are convinced that these theories are true and they use discovery teaching as the heart of their teaching approaches. If teachers will give pupils opportunities to draw conclusions from data that are provided or that they seek out for themselves, the pupils will benefit (Bruner, 1969). Problem solving approach is one such category where teachers help their students to do their own inquiring and research.

2.4. Problem Solving Approach

Knowledge giving does not meet the facilitation of learning and change (Yared, 2000). Hence, education is in the process of shifting from the mastery of a large body of factual information to an emphasis on the development of reasoning skills and the solving of practical problems. Yared, citing MOE (1997) and Somjen (1990), states that the need for this change is derived from long-standing concerns about a gross overcrowding of most undergraduate curricula which tax the memory but not the intellect and emphasizes the passive acquisition of knowledge much of which is forgotten or outdated and whose relevance is hardly appreciated by the students.

One such effort in developing reasoning skills in students is the promotion of problem-based curricula which use problems as the main or sole method of student. It was considered that a problem-oriented system would engage the students and promote a more integrative approach to the teaching and learning of various subjects. In a study made in Gonder Medical School it was concluded that a shift from the classroom

teaching to an active problem-oriented strategy is a realistic approach in Ethiopia (Yared, 2000). This is important given that both the family and the school prepare youth for a passive role (Tekeste, 1990; Ayele, 1969). Most students spend their school career in passive learning in which they are required to memorize factual material disseminated in class. Therefore Callahan and Clark (1988) for example suggest, though subtly, that all secondary school learning must, or should be, problem-solving learning.

Most inquiry, both in school and in the real world, is carried out by some variety of problem solving strategies. The problem at hand may be exceedingly complex, requiring great skill and effort for its solution, or it may be so simple that solving it is almost automatic. But, in any case, the problem-solving activity is one that requires thought and a search for solution. Examples of problem-solving approaches include such diverse activities as writing term papers, attempting to identify an unknown chemical, preparing an oral report, composing a menu, balancing a budget, or repairing a gasoline engine. These techniques include anything that lends itself to such questions as "How come?" "So what?" "If so, then what?"

The problem-solving approach has been much emphasized in the Ethiopian Education and Training Policy not only in terms of the goals set to education in the country but also as it is considerably student-centered approach. Therefore it is vitally important to clearly outline what this approach means and examine its implementation in light of the development and implementation of the new curriculum (syllabus and textbooks), training of teachers, the organization of education, classroom instruction.

2.4.1. What is Problem and Problem Solving Approach?

The word problem indicates that there is a perceived gap between what is wanted and what is available and problem-solving refers to the process of finding or constructing a solution in reducing or eliminating this gap (Opwis, 1994). McWhorter (1996) states that a problem occurs when "what is" (present state) is not "what is desired" (goal state). Nachmias and Nachmias (1987) state that a problem is an intellectual stimulus calling for an answer in the form of a scientific inquiry.

Sternberg and Davidson (1992) admit that almost everything that an individual does involves problem-solving or behavior that is directed toward achieving a goal. They say any problem situation contains three important characteristics: givens, a goal, and obstacles. The givens are the elements, their relations, and the conditions that compose the initial state of the problem. The goal is the desired outcome or solution of the problem. The obstacles are the characteristics of the problem solver and the situation that make it difficult for the solver to know how to transform the initial state of the problem into the final state. Azeb (1995), as cited in Desta (1995), says problem solving is a whole way of behaving, a way of attacking a situation, of mobilizing pertinent thinking process.

Mayer (1992) states that a major goal of education is to help students become more effective problem solvers, that is, people who can generate useful and original solutions when they are confronted with problems. He says that a problem consists of a given state (i.e. a description of the current situation), a goal state (i.e. a description of the desired situation) and a set of operators (i.e. rules or procedures for moving from one state to another). This means a problem occurs when a situation is in one state, the problem solver wants it to be in another state, and there are obstacles to a smooth transition from one state to the other. Metasebia (1999) states that problem solving does not take place if a solution strategy is immediately apparent. Citing De Vault (1981:40) Metasebia (1999) says problem solving occurs when an individual seeks to answer question for which that individual has no readily available strategy for determining the answer.

Desta (1995) discussing the problem solving approach in terms of education, states that it is a fundamental means of enabling the leaner to search to solutions for a given problem. It allows the learner to use his prior knowledge and skills to arrive at a resolution of challenging problem.

2.4.2. Problem Solving Approach as Student Centered Methodology

Temechegn (2002) states that learner-centered methodology stresses the need for taking care of the child, its growth and development. It includes a number of teaching

techniques and strategies all of which require individualization of approaches so that one must a) study the child carefully, b) keep observations over a period of time, and c) study the growth and development in intellectual, language, sensory-motor, emotional, etc areas. In so doing, learner-centered methodologies emphasize the process rather than the product and are activity-based with different teaching strategies.

As broad and general the term student-centered methodologies are different authorities have used different terms in order to describe it. Brandes and Ginnis (1986) list the following terms: student centered learning, inquiry, experiential, humanistic, confluent, progressive, participatory learning as being used by different authorities.

Whether or not a given activity is learner-centered depends largely on who is in charge – who decides what should be learned, who should learn it, what methods and resources should be used, how the success of the effort should be measured (Temechegn, 2002). To the extent the learner makes those decisions, the approach is generally considered as Learner-Centered Methodology. In this method students learn through cooperation, active involvement and participation. In this respect problem solving approach could be considered to be the most significant learner-centered methodology. In fact Bekalo and Welford (2000:96) as cited in Temechegn (2002) state that, there is a need to design appropriate curriculum and instructional strategies which allow pupils to experience a range of problems that generate the conceptual and procedural knowledge demanded both in and out of classrooms.

2.4.3. The Essential Elements of Problem Solving Approach

2.4.3.1 The process in problem solving approach

Duncker (1945) noted that 'when one can not go from the given situation to the desired situation simply by action, then there has to be recourse to thinking' and 'such thinking process has the task of devising some actions which may mediate between the existing and the desired situations. Research in the late 1960s and early 1970s illustrates the trend toward applying psychological theories of development and learning to problem solving. This resulted in a better definition of the component

process skills or behaviors of inquiry. Shulman and Keislar (1966) classified the component skills into four categories:

1. ***Problem sensing***. A discrepant event or an apparent incongruity stimulates the awareness of a problem.
2. ***Problem formulating***. An attempt to define or clarify the problem is made. Solutions to the problem are anticipated.
3. ***Searching***. Questions about the problem are raised. Information is gathered. Hypothesizes are formulated and alter native solutions are explored.
4. ***Problem resolving***. The incongruity or disequilibrium is removed and the problem is resolved to the satisfaction of the learner.

McWhorter (1996) says that there are a number of ways to solve a problem: these various ways to solve a problem are called solution paths. Then he puts the following model for problem solving:

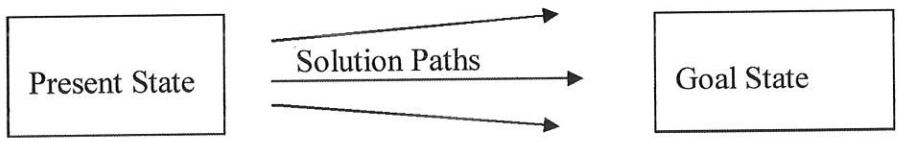

Figure 1. A model of the process of problem solving.

Looking at problem solving as a patterned thought process or a series of specific behavioral steps has been supported by numerous researchers who have articulated similar steps, but with varying emphasis (Obourn, 1956; Callahn & Clark, 1988). The delineation of specific process skills has served as a springboard for research and instruction on problem solving approach. Barr (1994) states that much of the resulting research on process skills is prescriptive in its attempt to validate specific instructional strategies and curricular approaches that enhance the problem-solving abilities of the student.

Listing the best ways to improve problem-solving abilities in students, McWhorter (1996) says that it is needed to develop a systematic approach and to use it consistently with all types of problems. He then gives the following step-by-step approach to problem

solving;

1. *Specify the problem*:- identifying the problem as specifically as possible. It involves evaluating the present state and determining how it differs from the goal state.
2. *Analyze the Problem*:- learning as much as you can about the problem,
3. *Formulate Possible Solution Paths*:- identifying a wide range of possible solutions,
4. *Evaluate Possible Solution Paths*:- weighing the advantages and disadvantages of each solution path,
5. *Choose a Solution*:- selecting one solution path which is compatible with your priority, less-risky, and practical.

Sternberg and Davidson (1992) also list few specific elements that compose general problem-solving processes:

1. *Identifying the Problem*:- Understanding that a problem exists and what exactly the problem is,
2. *Forming an Internal Representation*:- making a mental map of the elements, the relation among elements and the goals found in the externally presented problem,
3. *Encoding*:- encoding the critical elements of the problem,
4. *Planning*:- deciding how to proceed to solve the problem, plan steps and resources to use in solving the problem,
5. *Strategy selection*:- deciding how the plan should be implemented,
6. *Solution monitoring*:- keeping track of what is done, what is being done right now and what still needs to be done.

Callahn & Clark (1988) state that essentially any learning activity in which the learner has to hunt for or think out answers is a problem-solving activity. After discussing briefly the steps in problem solving Callahn and Clark summarily say that 'in short we must become aware of what the problem is; look for a solution; and check the solution to see if it is any good.

For our later discussion we can state briefly that problem solving process composes at least three steps: problem identification, searching for strategies to solve the problems and acting on the best strategy. These are some of the process skills the current research tries to find in students.

2.4.3.2. Content and attitude in the process of problem solving approach

Suchman (1960) expounded on the futility of teaching process skills outside a content context. The whole nature of problem solving is content embedded. Scientific problems are formulated as the result of a cognitive dissonance. Clarification, problem analysis, and problem resolution depend on the relevant concepts stored in memory (Greeno, 1978; Novak, 1977). One has to bear in mind that content knowledge that can be retrieved and applied to a problem is a critical factor in any successful problem-solving strategy. This means that problem solving process doesn't exclude the discussion and examination of relevant topics.

Moreover attitudes that are consistent with the nature of science are necessary for successful problem resolution. Scientific attitudes are nurtured when the problem solver experiences *ownership of the problem* to be solved. The problem must be derived from the students' own conceptual framework. The student needs to see the problem as meaningful and relevant. The problem must be generated by the student and not imposed by the teacher. Pizzini et al. (1989) found that "student ownership of the problem is one of the most essential variables resulting in successful problem solving" (p. 7).

Once applicable concepts are stored, and an ownership of the problem has been achieved; problem-solving abilities can be enhanced through instruction on logical reasoning strategies or process skills.

It can also be said that the problem-solving process had many dimensions. Some researchers concentrated on the nature of the scientific enterprise and the attitudes and behaviors required of successful practitioners. Lists of behaviors consistent with a

scientific attitude were developed. Behaviors included such things as a desire to try things out experimentally, willingness to change one's opinion or conclusion when confronted with new evidence, determination to be objective in judgment, and unwillingness to base a conclusion on one or a few observations. Many tests were developed to measure one or more elements of the scientific attitude (Keeslar, 1956; Baumel & Berger, 1965). The complexities of these scientific attitudes are so great, however, that encouraging them has proved to be an enormous undertaking. Future researches must address the barriers preventing the inclusion of scientific attitudes as valued educational objectives.

2.4.3.3. Research on instruction with problem solving approach

A. International

McWhorter (1996) states that problem solving is a skill, like reading, writing, driving a car or playing tennis. While some people may have a natural aptitude for it, problem solving is a skill that you can and should develop. Because of this assumption, a number of experiments were made on how to instruct students with problem solving approach.

One such experiment is a study made to understand the effects of inquiry training on the problem-solving skills of elementary science students done by Suchman (1960). Suchman developed the Inquiry Training curriculum, which was used in a 3-year study with five-grade students. The curriculum utilized inquiry strategies to motivate the learning of science concepts, while, at the same time, stimulating the growth of scientific problem-solving skills. The Inquiry Training curriculum consisted of a series of single-problem film loops, a handbook of teacher demonstrations of discrepant events, and a student handbook with simple illustrations of science discrepancies. Then the children were introduced to a three-stage plan:

In the first stage, the children identify the objects and systems embedded in the problem, conditions that exist, and changes that occur during the episode.

In the second stage, the children focus on which conditions are really necessary to produce the event.

In the third stage, children formulate imaginary tests to verify perceived relationships.

Suchman found that the inquiry skills of the fifth-grade students improved when they were exposed to the Inquiry Training Curriculum.

Neal (1961) provided instruction in the following process skills to students in grades 1 through 6 in a laboratory school setting: identifying and stating problems, selecting pertinent and adequate data, formulating and evaluating a hypothesis, generalizing and forming a conclusion, and applying concept or seeing relationships.

B. Local

There aren't many studies on how problem solving approach can be implemented in the Ethiopian context. One research that can be mentioned in this respect was a descriptive research made by Desta Abera (2001) on 'factors influencing the implementation of problem solving approach in 2nd cycle primary school of Tigray.' This particular research has been reviewed under section 2.6. The other research that can be mentioned in this line is Selashi Legesse's (2001) thesis on 'Making and Implementing Education Policies in Ethiopia since 1974: Problems and Prospects.' Lamentably, he didn't make the problem solving approach as a point of investigation though he made a wonderful analysis of the other features of the present policy.

A two year pilot study was also made in Gondar medical college on using problem solving approach in the teaching of physiology (Yared, 2000). In the study the tutor designed problems with instructional objectives. Students were instructed to group themselves into small physiology teams. Then teams selected particular problems from the mini-library of cases. They were guided to approach the problem systematically through the search for relevant materials, consultation with the faculty and visits of practical sites. After the exploration of the scenarios whole class presentations followed. Finally students who participated in the program evaluated the problem oriented approach. According to Yared, results were generally

favorable; students felt that the learning became meaningful and improved their ability to solve problems.

2.4.4. What do We Need in the Instruction of Problem Solving Approach?

In a classroom instruction we need to know what elements truly compose the problem solving approach. Different scholars tried to identify important elements of problem solving approach at classroom level some of which are listed below;

A. The ability to recognize and state problems can be developed through techniques including the use of discrepant observations obtained from current events, field trips, demonstrations and questions posed by the instructor (Neal, 1961).

B. The type of questions, whether it is open or closed ended and wait time variable all contribute to the students' critical thinking in problem solving process (Rowe, 1986). The longer the wait time, the amount of time the teacher pauses after a question, the more the productivity of students is enhanced. The capacity to hypothesize and the need to experiment increases (Seime, 2002).

C. Problem solving models rank hypothesis formation high among the skills necessary for problem solving and at the same time researches proved that skill in hypothesis formation can be taught (Barr, 1994).

D. Problem solving is supported by activities and experiences that cause children to reflect on the strategies used to solve a problem (Cyert, 1980).

E. Problem solving is supported by providing students with standards that help them evaluate their own hypothesis.

F. Problem solving is supported by social interaction about problem before experimentation (Barr, 1994).

G. The attitude for problem solving can be developed through the hidden curriculum and the actual process skill can be developed by instructional strategies (manifest and experienced curriculum).

In the instruction of students with problem solving approach pupils need help in finding questions to ask and investigate. The teacher may be able to help them by suggesting

problem areas or specific problems to them by either directly or indirectly setting the stage. It must also be made sure that problems students select are suitable for their purposes. Callahn and Clark (1988) set the following criteria for students to use in testing the suitability of the problem:

1. Is it pertinent to the course objective?
2. Is it relevant to pupils' lives and to community life?
3. Is it feasible? Do we have the necessary resources? Can we complete it in the time available? Can the pupils handle it?
4. Is it worth the effort?

2.4.5. The Status of the Problem Solving Approach in Ethiopian Education

An educational implication of all the above discussions is that problem solving can and should be taught in schools and real-world settings. If we cannot make the lessons problem oriented lessons, instruction in subject matter areas should focus on helping students learn the cognitive processes and strategies required for successful problem-solving.

It is not therefore surprising that the Ethiopian Educational Policy gave emphasis on instructing students with the aim of developing the capacity of problem solving. A document produced by Ministry of Education on the Education and Training Policy and Its Implementation (2002:11) stating the problems of the education system in Ethiopia prior to the development of the new policy says;

> The old educational system did not emphasize, science and mathematics and the use of modern technology in general and was proficient[2] to produce men and women capable of solving the practical problems of the country.

Moreover it adds that;

> ... the curriculum was not structured to address the pressing needs and problems of Ethiopia.

[2] The word proficient here seems to be placed inappropriately. The statement supposedly wanted to accuse the old educational system for its inability 'to produce men and women capable of solving the practical problems of the country'.

After enumerating the shortfalls in the education system, it concludes that the educational system was divorced from practice and was not relevant and capable of solving the problems of the country.

As mentioned earlier, there are almost no experimental researches done on how to implement the problem solving approach of the education policy particularly at lower grades. A recent descriptive research done by Desta Abera (2001) is a good example in describing the effort to implement the approach particularly in Tigray region. He studied the factors influencing the implementation of problem solving approach in second cycle primary school of Tigray. He surveyed teachers, curriculum experts, educational supervisors and students and made classroom observations in order to see what human and non-human factors are influencing the implementation of problem solving approach. He said that although the policy of the country adheres to the new problem solving approach for the schools of the country, there seems to be problems of implementation related to various factors. He found out that factors like lack of training in the part of teachers, overcrowded classrooms, lack of laboratories, and poor supervision negatively affected the implementation of problem solving approach. He also concluded that curricular materials focused on cognitive activities and didn't help much for the approach. He finally recommended that interested researchers to make intensive researches on the implementation of problem solving approach.

2.5. The Importance of Problem Solving Approach to Rural Schools

2.5.1. Background of Rural Areas

Rural areas have their own distinct features and challenges. Some of these challenges are;

A. Distance from science and technology

In a discussion of the characteristic features of rural societies and how these impinge on development Weitz (1971) states that, one such feature is that there is very rarely any application of science and technology to the economic activities of these societies.

B. Their holistic view of life is in direct opposition to the dominant view of so called civilized societies' fragmented view of life (Arbab, 2000).

C. The illusory hope of rural people on formal education

Millions of rural people have had a glimpse of the 'prosperity' of urban man, and rising expectations have become explosive. As a result rural people send their children to school with the hope of a better future for their children and themselves (Daniel, 2003). In almost every developing country, people have seen education as the key to the betterment of their living condition, and to prosperity. Formal education has become a hope for the local boy/girl to escape from the gnawing poverty and drudgery on the land. Given the population explosion and the specter of hunger they have little choice. Unfortunately, such hope of prosperity is not met as the rural people remained poor throughout the existence of formal education in their area.

D. Irrelevance of curriculum to the culture and the objective conditions

It was early recognized that education (particularly science education) in Africa did not take into account the intellectual and cultural milieu of the children (Temechegn, 2001). Questioning the pattern of science education in Ethiopia, Temechegn argues that the majority of the school pupils live in rural and semi-rural areas where there is little need for extensive (solid) theoretical science. Lamenting the irrelevance of formal education to developing countries, Seyoum (1996) for example states that the major slogan of educational reforms in Ethiopia was to make the school curriculum relevant to the learners' cultures. Citing George (1988) Temechegn (2001) states that when students have exposure to socially relevant curricula they would understand the role of science in their society, apply their science knowledge to real-life situations and develop skills of decision-making and problem solving. He adds that such exposure can be achieved by including indigenous knowledge and native technology into the science curriculum, which is not being done now.

2.5.2. The Relevance of Problem Solving Capacity to Development

Montada et al (1994) say that most problems in human development belong to one of the following three categories;

a) a desired or prescribed goal cannot be reached by using well-established routines, and new solutions, new insights, new skills, or new knowledge are required;
b) goals that have been pursued must be abandoned because of losses, failures, or constraints, and alternative goals must be chosen or established; and
c) two goals are incompatible and a decision that the less favored goal has to abandoned is required.

In short many developmental problems can be conceptualized as discrepancies or incompatibilities between goals, opportunities, demands, capacities and resources. So having understood the meaning and advantage of problem solving approach, one can state that a development process can be set in motion by educating children with problem solving capacity.

From the point of view of both material and intellectual development the acquiring of problem solving attitude and skill become crucial. It is assumed that the more people are equipped with problem solving skills and put it to the best use in a planned way - the faster will be the pace of development.

Chapter Three

3. Research Design and Methodology

3.1. Research Design

This study has taken a form of case study in that it examines a single aspect of the instructional approach of eight rural primary schools of one single Woreda. The case study probes deeply and analyzes interactions between the factors that explain present status of the implementation of problem solving approach (Best and Kahn, 1989:92; Patton, 1987:19). Patton (1987) states that case studies become particularly useful where one needs to understand some particular situation in great depth, and where one can identify cases rich in information. The sample Woreda is affected by different natural and man made problems which provide an appropriate context in the implementation of problem solving approach.

The case study focuses mainly on describing, recording, analyzing and interpreting the conditions that exist in relation to the implementation of problem solving approach in the rural primary schools of the Woreda. Once the Woreda is chosen for its typicalness, the next phase in the research process was reviewing related literature. The literature review helped in determining what to look for in the schools of the Woreda and in the development of the instruments of data collection. So the sources of data have been classrooms, students, teachers, principals, documents and school facilities. And the data from these sources were gathered in multiple methods of data collection including observation by the researcher, interviews, questionnaires and document analysis.

As problem solving approach is an instructional process the main source of the data is classroom observation. However questionnaires for students and teachers and interview with principals have also helped in describing the status of the approach and the challenges and prospects in its implementation. Both purposive and random samplings have been used in filling questionnaires while all available principals were interviewed. Once the data are gathered from the sources the next phase was to present and analyze the

data under the different themes that pertain to problem solving approach in the instruction process.

3.2. Background of the Research Setting

Adami Tulu Juo Kombolcha Woreda, selected for the study, is found in Oromia region, about 160 km south of Addis Ababa. The Woreda covers an area of 1274.54 km^2 with a population density of 115 persons per km^2 (Daniel, 2003:16). The Woreda falls within the rift valley and accommodates part of the Arsi Oromo. According to a data obtained from Adami Tulu Agricultural Research Centre, the Woreda is semi-desert, unlike the many other Woredas in Oromia, with minimum and maximum daily temperature of 13.0^0c and 27.9^0c respectively. According to Daniel (2003) rainfall has been very erratic and unreliable in recent years resulting a very severe drought. Malaria is very endemic to the area and claims the lives of many in the Woreda during wet seasons. These situations definitely affect the social and economic lives of the people. By extension, it can be concluded that the schools and the students in the Woreda are highly affected by these particular situations.

3.3. Source of Data and Sampling Procedure

3.3.1. The Schools

The study included all eight rural primary schools in the Woreda which have second cycle - with special emphasis on eighth grade (Refer Table 1). The schools are widely scattered among the Woreda; the furthest distance being about 60 km between Abosa primary school and Judo primary school. Out of the eight primary schools in the category, the two primary schools, Batu number one and two, can be considered as semi-rural primary schools than rural primary schools as their location is in the periphery of Ziway town. Regardless of their locations the majority of the students who attend the Oromiffa shift[3] come from the surrounding rural localities.

[3] In some areas of the Woreda where there are many children whose mother tongue is Amharic the school assigns one of the shift to these children. However the text books they use are the direct translation of the Oromiffa versions into Amharic. The sources of data in this case become the students in the Oromiffa shift.

Table 1. The sample schools and the source of data included in the study

No.	Name of the Primary School	Sample Students			Sample Teachers			Principals		
		M	F	Tot.	M	F	Tot.	M	F	Tot.
1	Abosa	18	2	20	6	11	17	1	-	1
2	Adami Tulu	17	3	20	8	12	20	1	-	1
3	Adami Tulu Dombosco Catholic	17	3	20	11	2	13	2[4]	-	2
4	Batu Number One	15	5	20	4	25	29	1	-	1
5	Batu Nubmer Three	16	4	20	17	3	20	1	-	1
6	Bulbula	19	1	20	20	6	26	1	-	1
7	Jido	20	-	20	9	5	14	-	-	-
8	Woransa	20	-	20	7	6	13	1	-	1
	Grand Total	**142**	**18**	**160**	**82**	**70**	**152**	**8**	**-**	**8**

3.3.2. Classrooms

Since the main research question was on the implementation of problem solving approach, which is an instructional process, classrooms served as the main source of data. Therefore, classrooms in each school were made as key source of data. (For a summary of the subjects and the number of observations made in each school please refer Table 2 under section 3.4.1.)

3.3.3. Students

As the nature of reality is too complex to be grasped and described by one mind, one formula or one method, it has been found important to have a variety of sources of data. Therefore students were taken as one source of data so as to vindicate their status in terms of their knowledge and attitude on problem solving.

For the sake of brevity and focus the study was made on classrooms and students of eighth grade. The present researcher has at least three reasons for selecting this particular class and grade: first, these students are expected to show the cumulative wisdom of their previous grades instructions; second, it is at this level that many of the students join back home the farming career whether by completing or dropping out. Third, it is at this level that they are considered to be 'capable of solving environmental and other problems' (MOE, 2003:78).

[4] Both the principal and the vice principal of the school participated in the interview.

Then twenty eighth grade students from each school were randomly sampled to fill questionnaires. Once the students are sampled they are given a separate place to fill the questionnaires. The research objective was discussed openly and their questions were answered if they have any. However the writing environment were controlled to make sure that every student writes for her/his own self. It took them 50-80 minutes to fill the questionnaires. And it was also made sure that everyone has returned the questionnaire. All in all 160 students participated in filling out the questionnaires.

3.3.4. Teachers

As teachers were considered rich source of information, the plan was to use all 192 teachers teaching in the sample primary schools as source of data. However thirty two teachers were not found in the schools as they were absent during the presence of the researcher in the respective schools. Some of them traveled to Ziway and Adama towns for different workshops while others were absent for health and social reasons.

The teachers were briefed about the research objective during their break time and were asked to take the questionnaires and fill at home. Five teachers didn't return the questionnaire at all for various reasons and three teachers returned without any response; making the total teacher respondents 152.

3.3. 5. Principals

All the principals of the eight schools were also to be used as a source of data, however, one of the principal could not be found, so seven principals and one vice principal have been taken as sample in this case.

3.3.6. Pedagogical Centers, Laboratories, Libraries

Pedagogical centers, laboratories and libraries are very important facilities that should occur in schools in order to implement many of the innovations in the education and training policy. Therefore they are taken as sources of data wherever available.

3.3.7. Textbooks

Stake & Easley (1978) state that in the United States of America itself ninety-five percent of science teachers tend to use a textbook 90 percent of the time. Assuming this could also be true to the Ethiopian case, a brief examination of the text books was made with respect to their helpfulness in the instruction of problem solving approach.

Given the high quantity of text books for primary schools, the research focus was on the textbooks prepared for grade 8. The Chemistry, Physics, Biology and Social Studies text books were studied as the subjects are very much conducive to the instruction of problem solving approach.

3.4. Instruments of Data Collection

3.4.1. Classroom Observations

In the last analysis it is in the world of 'classroom' where all hidden and manifest intentions and efforts of education occur. Based on this we can say that classroom observation is a key instrument of data collection in describing what methods are being implemented/used during instruction. Written curriculum important as it is, it is highly influenced and characterized by classroom instructions. Classroom instruction is a kind of melting pot where the experience of the students and teachers, the classroom condition, the quality of text books, supervision, and necessary facilities meet and interact to create the citizens envisioned by the education and training policy.

Therefore the major and central source of data of this study was the classroom observations. Interviews and questionnaires were meant to explain the 'why' of the classroom interactions: they provided the reasons how and why things were happening in the way they were happening. In fact compared to the central position classroom interactions hold in describing the variable of methodology, the other variables like teachers' training, textbook or administrative support are peripheral. So classroom observations were made as a starting and central point in describing the implementation of problem solving approach in rural primary schools. In order to be consistent with the concept of rural community, observations were made only on Oromiffa shifts.

Forty eight classroom observations were made in eight schools (Please refer Table 2). There was an average of six observations in one school. The observations were evenly divided between natural and social science classes. At least two observations were made for one selected subject and teacher. The subjects observed included biology, social studies, chemistry, physics and English language.

The classroom observations were made in two ways. The first one is observing and making notes according to a checklist prepared for the purpose (See Appendix Three). The assistant researchers fill the checklist based on a previous training and with some assistance from the main researcher. While the assistants fill the checklist the main researcher takes notes of what major actions the teacher and students take from the beginning thru to the end of the period. All in all the observations were focused in finding out if and how the steps of problem solving approach are being implemented in the process of instruction. The checklist for the observations included what, how and why the teacher and the students are doing compared to what they should have done with respect to implementing the problem solving approach.

Table 2. Type and number of subjects observed in each class

No.	Name of the Primary School	Subject Observed and Frequency of Observation[5]					
		Bio.	So. St.	Chem.	Phys.	Eng. Lang.	Tot.
1	Abosa	2	3	2	-	-	7
2	Adami Tulu	2	2	-	2	-	6
3	Adami Tulu Dombosco Catholic	2	2	2	-	-	6
4	Batu Number One	2	2	-	2	-	6
5	Batu Nubmer Three	2	3	-	-	-	5
6	Bulbula	2	2	-	-	2	6
7	Jido	2	2	2	-	-	6
8	Woransa	2	2	-	-	2	6
	Grand Total	**16**	**18**	**6**	**4**	**4**	**48**

3.4.2. Questionnaire

Two kinds of questionnaires were used: one for teachers and another for students. All questions were open ended except that the questions needed a previous yes/no/other

[5] Key: Bio. = Biology, So. St. = Social Studies, Chem. = Chemistry, Phys. = Physics, Eng. Lang. = English Language

answer before elaboration (Appendix Four and Five). The questionnaires for teachers were administered in Amharic as it was assumed that teachers understand and respond to questions in Amharic than in English. The questionnaires for students were translated into Oromiffa language as students are considered to respond better to questions in Oromiffa. It was back translated by people other than the original translators to check reliability of the translation. The medium of instruction is also in Oromiffa as it is the local language.

Both questionnaires were pilot tested on 40 students and 20 teachers of the Woreda. The earlier plan was to administer the student questionnaire both to fourth and eighth grade students as the grades are the end of the first and second cycle of primary schools respectively. But as the result of the pilot test showed, fourth grade students didn't have the necessary writing skills to fill a questionnaire as most of their writing was illegible and cannot be understood. It was decided to focus only on eighth grade students. Some questions in both questionnaires were also corrected to make them clearer or canceled for redundancy.

The questions in the questionnaires for the teachers were aimed at discovering what training the teachers had in terms of problem solving approach, how they are trying to implement it and what challenges they face during implementation.

The questions in the questionnaires for the students were aimed at discovering on what level of understanding students are found in terms of the process of problem solving and their attitude towards facing and solving problems. Of course open-ended responses on questionnaires represent the most elementary form of qualitative data as it is related to writing skills. Yet even at this simple, elementary level of measurement, the feelings revealed in the open-ended comments of a single teacher/student illustrated the power and depth of qualitative data.

3.4.3. Interview

The major way in which a qualitative evaluator seeks to understand the perceptions, feelings and knowledge of people in programs is through in-depth, intensive interviewing (Best & Kahn 1989). In this study interview was used to get data from the principals. It is not only because they were few in numbers that interview was administered to the principals but also their important positions in describing the implementation of the problem solving approach. In one of the school the principal was assigned in January 2004 in the school and he volunteered to be interviewed with the vice principal in order to give appropriate information. Six interviews were recorded with cassette recorder. One principal was not willing to be recorded, so his responses were jotted down as fully and as accurately possible.

Principals have experience as a student, as a teacher and as an administrator. They know the strength/challenges, weakness and opportunity of each sector of the school community. Therefore, informal discussions on different questions of the research were held wherever and whenever possible beside the formal interviews. The recorded cassettes were transcribed later for further analysis.

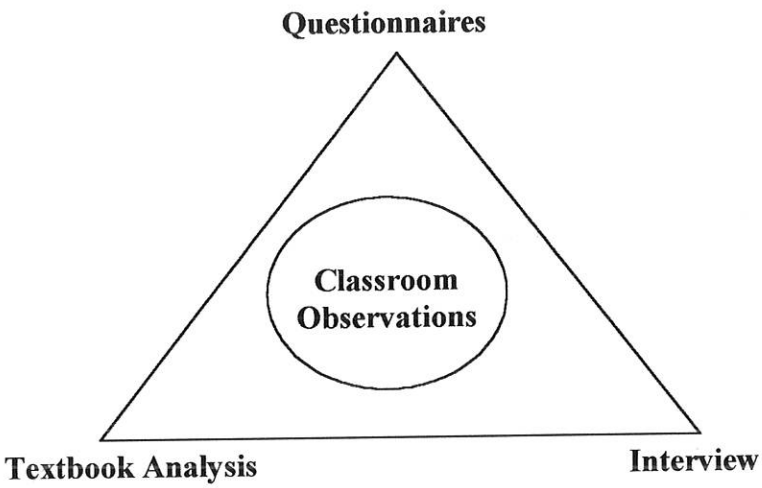

Figure 2. A model showing the triangulation of the instruments of data collection.

3.4.4. Content analysis

Since textbooks hold an important position in classroom instruction, analysis is made for four eighth grade subjects. What has been basically done in the analysis is trying to find out the presence of any direct discussion on problem solving process in content presentation of each unit in each subject, and checking exercises and experiments if they are in line with problem solving approach as applied to the context of rural schools.

3.5. Data Management and Analysis

The data generated with the above mentioned instruments are presented in two forms. The first type of presentation is a discussion of the findings sometimes supported by theoretical arguments. The other type of presentation is the placing of responses, mostly through ranking, in table forms. 'Frequency of response' in the tables represents how many times a particular response appeared in different questionnaires. Frequencies sometimes could correspond to the number of people who responded to the particular question under discussion. It is also possible that a teacher or a student gives more than one response or no response to a question as most of the questions are open ended. In the later case the frequency doesn't correspond to the number of people who responded to the questions. This kind of presentation shows the range and diversity of opinions voiced by respondents. Some tables are also placed in the appendices section in order to minimize the interruption in the flow of discussions.

Percentages are given in places where there are specified choices. In 'yes' or 'no' response and some other places a space is given for 'other comment'. This is not to bind respondents with limited categories of responses the researcher proposed. They are used as a basis for further probing questions. In some cases where respondents have a different or special comment it is shown in the discussion.

Direct quotations and careful description of program situations, events, people, interactions, and observed behaviors have provided the data. Then in some instances descriptions are presented as open-ended narration without attempting to fit program activities or peoples' experiences into predetermined, standardized categories.

Chapter Four

4. Presentation of Data and Analysis of Findings

4.1. Profile of Schools, Teachers and Students versus Problem Solving Approach

4.1.1. Profile of the schools

1. Abosa Primary School

Abosa Primary School is located about 153 km south of Addis Ababa off the main road to Awassa. The locality in which the school located is semi desert like all the other localities of the Woreda. The school has no any fence except some cactus and aloe vegetation marking the boundary of the school. The compound is highly dusty with no sign of any kind of water whether for human beings or plants. It has a total of 1184 studetns: 719 male 465 female. It has a total of 17 teachers: six male and eleven females. Teacher student ratio is 1:70. Average class size for eighth grade is 40. It has no laboratory but it used to have science kit in the pedagogical center. However in December 2003 a heavy wind destroyed the pedagogical center, a single room near the classroom buildings, and much of the properties of the pedagogical center is now locked into a small room. There is a small library which has outdated text books only and students are not using it properly.

The warm and dry weather, the dusty ground, the low economic status of the students and the school remind of the significance of problem solving approach. It provides a background of problems through which a context occur for the instruction of problem solving approach. Observations were made for three days in the schools for seven periods of three subjects (See Table 2). Twenty students and all the 17 teachers filled questionnaire. The principal also was willing to be interviewed and tape recorded.

However, the data shows that there is no any particular finding different from the overall findings of the other schools (as outlined in the sections below).

2. *Adami Tulu Primary School*

Adami Tulu Primary School is located about 168 km south of Addis Ababa on the right side of the main road to Awassa. Adami Tulu is a semi-rural town with a characteristic warm and dry weather of the Woreda. Compared to the other primary schools in the Woreda, except the Dombosco Catholic school, the school appears to have a better environment for teachers and students in providing staff room to teachers and some tree shades to students. It has a total of 2765 students: 1593 males 1172 females. It has a total of 36 teachers: sixteen males and twenty females. Teacher student ratio is 1:77. Average class size for eighth grade is 60. It has no laboratory. But it has science kit in the pedagogical center for teachers use according to their discretion. There is a no any library.

Like the other schools the warm and dry weather, the dusty ground, the low economic status of the students and the school remind of the significance of problem solving approach. They provide a background of problems through which a context occurs in the instruction with problem solving approach. Observations were made for three days in the schools for six periods of three subjects (See Table 2). Twenty students and twenty teachers filled the questionnaires. The principal also was willing to be interviewed and tape recorded. The data gathered from these sources show that there is no any particular finding different from the overall findings of the other schools.

3. *Adami Tulu Dombosco Catholic Primary School*

Adami Tulu Dombosco Catholic Primary School is located in the same semi-rural town where Adami Tulu Primary School is located. It is established and run by the Catholic Church. According to the school principal the school follows the curriculum of the government. The Woreda education bureau monitors the strict implementation of the curriculum while the school has independence in the school's administration and budget.

Due to enough budget allocated to the school; the facilities both inside and out side the classrooms are in a far better positions than the other government schools. Classroom buildings are well built and neat. There is a supply of clean water to the school from

water-well dug by the school itself. It has an agricultural site where it grows vegetables to raise fund for the school at the same time providing a source of income for those poor students who work on the site. The school environment provides a demonstration of what can be done in the area if there were enough budget and leadership.

The school has a total of 416 students: 217 males 199 females. It has a total of 13 teachers: eleven males and two females. Teacher student ratio is 1:32. There is only one eighth grade with 34 students. It has no laboratory. It has science kit in the pedagogical center but it is not being used as there is no any trained teacher on how to use it. The school has library with few books. Students are encouraged to use the library in their free periods.

Observations were made for three days in the schools for six periods of three subjects (See Table 2). Twenty students and all the thirteen teachers filled the questionnaires. The principal was willing to be interviewed and tape recorded with the vice principal. As the curriculum and instruction is exactly the same with the other schools the data gathered from the school show that there is no any particular finding different from the overall findings of the other schools.

4. Batu Number One Primary School

Batu Number One Primary School is located about 163 km south of Addis Ababa on the left side of the main road to Awassa. It is found at the outskirt of Ziway town catering for the needs of both for the students in the surrounding rural localities and Ziway town. This is one of the schools which has separate Amharic and Oromiffa shift. All the students from the rural localities attend the Oromiffa shift and they are the ones who filled the questionnaires. Classroom observations also took place in the Oromiffa shift. It has a total of 4374 students: 2265 males 2109 females. It has a total of 52 teachers: 23 males and 29 females. Teacher student ratio is 1:84. Average class size for eighth grade is 74. It has no laboratory. But it has science kit in the pedagogical center, which was not able to be visited as the person in charge was not around. There is no any library.

Observations were made for three days in the schools for six periods of three subjects (See Table 2). Twenty students and twenty nine teachers filled the questionnaires. The principal also was willing to be interviewed and tape recorded. The data gathered from these sources show that there is no any particular finding different from the overall findings of the other schools.

5. Batu Number Three Primary School

Batu Number Three Primary School has many similarities with Batu Number One in that it is located at the other end of Ziway town. They are also similar in the type of students and languages they address. It has a total of 1367 students: 814 males 553 females. It has a total of 21 teachers: 18 males and 3 females. Teacher student ratio is 1:65. Average class size for eighth grade is 58. It has no laboratory. But it has science kit in the pedagogical center. The present researcher visited the pedagogical center which was full of dust and in disarray. The person in charge of the pedagogical centre admitted that no attention is given to the pedagogical centre and as a result he spends time working for his own business. There is no any library.

Over all observations were made for three days in the schools. Five periods of two subjects were observed while twenty students and twenty teachers filled the questionnaires (See Table 2). . The principal was willing to be interviewed but not tape recorded. The data gathered from these sources also show that there is no any particular finding different from the overall findings of the other schools. Therefore the data from the school is aggregated with the other schools.

6. Bulbula Primary School

Bulbula Primary School is located about 186 km south of Addis Ababa off the main road to Awassa. Bulbula is a semi-rural town with a characteristic warm and dry weather of the Woreda. It has a large water reservoir that stores the rain water collected from the two classroom buildings. It has a total of 3650 students: 2316 males 1334 females. It has a total of 26 teachers: twenty males and six females. Teacher student ratio is 1:140.

Average class size for eighth grade is 80. It has neither laboratory nor pedagogical center. There is no also any library.

Observations of classrooms and questionnaire filling took two days and a half. Six periods of classroom observation was made for three subjects (See Table 2). Twenty students and twenty six teachers filled the questionnaires. The principal also was willing to be interviewed and tape recorded. The data gathered from these sources show that there is no any particular finding different from the overall findings of the other schools.

7. Jido Primary School

Jido Primary school is the furthest school in the Woreda about 210 km south of Addis Ababa (22 km off the main road to Awassa. The road leading to the small village of Jido, where Jido primary school is found, is so bumpy that no car wants to go there. The area is highly affected by water shortage and low economic situations.

The school has a total of 1464 students: 985 males 479 females. It has a total of 14 teachers: nine males and five females. Teacher student ratio is 1:105. Average class size for eighth grade is 72. It has neither laboratory nor pedagogical center. There is no also any library.

Observations of classrooms and questionnaire filling took three full days. Six periods of classroom observation was made for three subjects (See Table 2). Twenty students and all fourteen teachers of the school filled the questionnaires. The principal was willing to be interviewed and tape recorded. The data gathered from these sources show that there is no any particular finding different from the overall findings of the other schools.

8. Woransa Primary School

Woransa Primary school is the most typical rural primary school in the Woreda in that it is located in the remote corner of the Woreda. It can be accessed only by bicycle or motor bike. There is no any kind of public or business service around the school. The school itself is in a devastated situation where there is no even a single classroom with

enough light. The teachers and students teach and learn under harsh environmental and school conditions.

The school has a total of 1229 students: 784 males 445 females. It has a total of thirteen teachers: seven males and six females. Teacher student ratio is 1:95. Average class size for eighth grade is 80. It has neither laboratory nor pedagogical center. There is no also any library.

Observations of classrooms and questionnaire filling took two and a half days. Six periods of classroom observation was made for three subjects (See table 2). Twenty students and all thirteen teachers of the school filled the questionnaires. The principal was not around the school and couldn't be found anywhere for interview. The data gathered from these sources show that there is no any particular finding different from the overall findings of the other schools except that they show an extreme situation of a rural school. This in fact indicates that the question of relevance and quality of education need to be addressed urgently and systematically.

4.1.2. Profile of teachers

A. Sexual Composition

Table 3 The sexual composition of the sample teachers

Male	Female	No mark	Total
80 (53%)	70 (46%)	2 (1%)	152 (100%)

The comparatively equal percentage of female and male teachers represents an appropriate reflection of the composition of the staff in many of the primary schools. This may indicate that either women are more inclined to teaching profession by virtue of their natural talent, or the job opportunity opened to women is the teaching profession, or both. In developing curriculum and instruction with problem solving approach this composition has to be taken into account. The nature of their motherhood allows women to contribute a lot in instructing primary school children but at the same time activities for problem solving process like field trips and demonstrations may be difficult for them. The data also indicates that women are ready to go to rural areas to serve the people for whatever reason.

B. Age and Teaching Experience

Table 4 The age composition of the sample teachers

Age	20-25	26-30	31-35	36-40	41-45	>46	Total
Qty.	33 (22%)	46 (30%)	53 (35%)	11 (7%)	8 (5%)	1 (1%)	152 (152%)

Table 5 The teaching experience of the sample teachers

Teaching Experience	0-5 years	6-10 years	11-15 years	16-20 years	21-25 years	>26 years	No mark	Total
	36 (24%)	63 (41%)	33 (22%)	10 (7%)	4 (3%)	1 (1%)	5 (3%)	152 (100%)

It is interesting to note that a larger percentage (87%) of the teachers teaching in rural schools is below 35, an energetic category of age which can be utilized to a constructive end. Teaching in general and instructing students with problem solving approach in particular needs a youthful personality as it involves a flexible attitude and greater follow up of students. A desire to try things out experimentally, willingness to change one's opinion or conclusion when confronted with new evidence, determination to be objective in judgment, and unwillingness to base a conclusion on one or a few observations are more simpler when one is younger in age (Keeslar, 1956).

Again it is interesting to note that 87% of the teachers have teaching experience below fifteen years while 65% of the teachers have experience below ten years. It means also 65% of the teachers were trained and deployed in the last ten year within which the new education and training policy was issued and being implemented. Supposedly they are expected to be familiar with the policy and the problem solving approach mentioned therein.

C. Educational Level

Table 6. The educational level of the sample teachers

Educational level	12	12+1	12+2	12+3	12+4	Total
	-	141 (93%)	11 (7%)	-	-	152 (100%

Very large proportions (93%) of teachers currently teaching in rural primary schools are graduates of Teacher Training Institutes (TTI). Many of them teach all kinds of subjects in the second cycle of the primary schools against the principle enumerated in the

education and training policy. This is an indication of the importance of training teachers with the problem solving approach in whatever level of training they are.

4.1.3. Profile of students

A. Students' sexual composition

Table 7 The sexual composition of the sample students

Sex	Male	Female	Marked both or none	Total
	139 (87%)	18 (11%)	3 (2%)	160 (100%)

The table shows a low proportion of female students compared to male students. This is because either girls were not able to make it from the start or they have dropped out in large numbers for various reasons. Having in mind the importance of supporting problem solving by social interaction or making the problem pertinent to the life of the students/community, the sex composition in classrooms doesn't represent real life situations (Barr, 1994). Women populations are equal if not slightly greater than men populations in the world we are living in (Ayele, 2003:10).

B. Students' age group

Table 8 The age group of the sample students

Age	10-15	16-20	21-25	Total
	112 (70%)	47 (29%)	1 (1%)	160 (100%)

The table shows that almost all the students in eighth grade are at the age of 10-20. This is an indication that they are mature enough to be instructed by problem solving approach (Suchman, 1960).

4.2. Instructional Process vis-à-vis Problem Solving Approach

The research took one Woreda, Adami Tulu Judo Kombolcha, for a case study; therefore the eight primary schools are treated as a whole. Data are presented in aggregate while sometimes unique situations are described separately to add more light to the aggregated data.

As a framework to observe teachers' instructional practices vis-à-vis the problem solving approach a model of instruction outlined by Armstrong et al (1978) is adopted here. In

their belief teaching can be thought of as a series of events requiring decisions. These decisions have been organized into five general headings:

1. Specifying performance objectives
2. Diagnosing learners
3. Instructional strategies
4. Interacting with learners
5. Evaluating the effectiveness of instruction

4.2.1. Specifying Performance Objectives

4.2.1.1. Consideration of the learning environment

According to the policy the student-centered approach gives emphasis on various exercises, student-teacher interaction, and encouragement of student inquisitiveness. As discussed earlier, based on this assumption problem solving approach deserves being student-centered. Therefore the first observation points in the class were how the classroom and its facilities are conducive to this objective.

Almost all the schools visited, except the Adami Tulu Dombosco Catholic School, are in a highly disheveled situation. They are not properly fenced, so domestic animals and passer-bys roam in the so called 'the school compound'. The dry and warm weather coupled with the absence of vegetation and gardens create a dreary scene of the schools. The dust, rising now and then by the stirrings of the wind, competes for attention as it rushes towards guests to embrace them in its fold. As doors and windows of classrooms are half opened to bar the dust from entering in, classrooms appear dark and uncomfortable for learning.

In almost all cases of the observations, the sitting arrangement is found to be so traditional that the desks and students face straight unto the blackboard. Even in few group discussions conducted in some classes, it was difficult to move desks so students themselves move on different directions to face their group members.

4.2.1.2. Lesson plan

Performance objectives are usually outlined in the weekly lesson plans teachers prepare and they determine the direction and focus of instruction. It is supposed to be submitted a week ahead of its implementation for approval by the principal.

In all the schools there is a centrally developed format but duplicated by the schools themselves. In four schools it was observed that the teachers themselves copy the formats. The formats included date, duration of the period, general objective, content, teaching methods and activities, sitting arrangement, continuous assessment, learning aids and evaluation.

In the process of classroom observations once the instruction is over the teachers were requested to show their lesson plans. Then the lesson plans were cross checked with the note on the instruction just finished and the checklist for classroom observation. (The 48 classrooms were considered as having 48 teachers in this case.)

Accordingly ten percent of the teachers didn't bring their lesson plans though they claimed that they have prepared the plans but forgot to bring it to the class. The remaining ninety percent of the teachers followed the procedures of presentation and the exercises in the text books. No teacher was observed referring the lesson plan during instruction as guide to classroom management. No teacher also mentioned the problem solving process as a whole or partially as a teaching method or activity in her/his lesson plan.

4.2.2. Diagnosing Learners

A failure to diagnose the status of the learner before beginning a new instruction results in classrooms filled with frustrated, bored, and unmotivated youngsters (Armstrong et al, 1978). Review questions on the topic discussed in the last period, questions aimed at assessing what students know in relation to the new topic to be learnt and checking assignments are some of the ways teachers can diagnose the learners' status. Classroom observations focused on the two former aspects.

4.2.2.1. Determining prior knowledge before the new lesson is presented

In problem solving approach before the teacher is going to present her/his lesson for the day, it is very essential to assess where the students stand. It is clear that everyone, whether young or old, has a certain conception of the world – the reality surrounding her/him. The understanding of problem and solution also depends on the conception we have about ourselves in the context of our environment. Therefore it is imperative for the teacher to assess where the students' level of recognition lie before delving into the day's lesson (Temechegn, 2001).

Rowe (1973) said that, since inquiry requires a significant amount of cognitive processing and is driven intrinsically by conceptual conflict rather than by extrinsic rewards a higher order of questioning, more wait time between questions and a reduced external reward system should improve student inquiry behaviors. Based on this, the type of questions and wait time between questions were points of observations in the classrooms.

A. The type of questions

The type of questions asked by ninety nine percent of the teachers as review questions are so closed that students quickly answer them as 'yes' or 'no' or just a single word or phrase gleaned from the lesson in the past period. Observations indicate that even as the lecture progress in the typical classroom, ninety five percent of teacher questions are at the recall or simple comprehension level. Questions that elicit synthesis and evaluative skills of thinking are rarely asked. It is only in 5% classrooms teachers were observed asking some questions that address higher order thinking as the lecture progress (why and how).

B. Average wait time between question and answer

The observation process in this case was to gauge the time the teacher gives to students to think over the answers on the questions forwarded to them. Unfortunately in almost all cases the observations show zero wait time. The constant trend is that teachers ask closed-ended questions and automatically the fast learners speak the answers or the

teacher continues lecturing by way of answering the question. The speed of the lecture is paced by the fast learners. In many occasions the students don't raise their hands to answer as the teachers also just throw the question as if to encourage everybody to answer at once.

However, out of the forty eight classroom observations made, it is only in four (8 %) classes teachers were observed asking two or three questions concerning the new topic to be discussed later. Otherwise the usual procedure (observed in about ninety two percent of the classes) in the instruction process is:

First the teacher arrives in the class, greets students as they arise from their chairs to salute her/him,

The teacher then asks two or three review questions on the topic discussed in the last period,

Third, two or three fast learners answer the questions briefly,

Once the teacher approved the answers, he/she proceeds immediately to introducing – lecturing on the new topic.

4.2.3. Instructional Strategies

About forty eight percent of the teachers put lecture as their priority method of instruction and seventy four percent of them listed lecture as one of their preferred method of instruction (See Appendix One: Table 1). In actual fact those who listed 'review questions' (10%) and using learning aids (2%) can be categorized under lecture method. Because what they mean by review questions is the question they forward when they prepare for the day's lecture. Learning aids are also used to support lecture as one teacher did when explaining about periodic table in chemistry period. The teacher was trying hard to explain the elements from a hardly distinguishable periodic table hanged over the wall. It was the teacher who made all the talk while many of the students sat indifferent to the sophistication of the explanation.

In lecturing the day's lesson the teacher occasionally asks questions on the topic. When five minutes or less remain for the period to end, opportunity is given to students to ask

questions. In fact many teachers continue to lecture until the bell rings to notify the end of the period at the point of which they immediately invite students to ask questions. As two or three fast learners asked questions and highly brief answers are given by the teacher, the session comes to an end. It is in two classroom observations (4%) that the teachers had been seen to have an ample time at the end of the periods to discuss questions and give home take assignments. This is mainly due to the need for content coverage and the way the text-books are organized. Teachers also didn't seem to take the time to organize the topics in different form than lecture method.

In fact lecturing could be useful by way of discussing the content needed that can be applied in problem solving process (Suchman 1960, Greeno, 1978). But when it replaces the whole process of student-teacher interaction it increases students' dependence against the objective of problem solving approach (Aggarwal, 1996).

Moreover a situation where two or three fast learners visibly dominate the scene of the lecture while the majority of students kept silent is contrary to the spirit of student-centered approach so advocated in the policy.

Twenty percent of the classroom observations show that teachers use group discussion as one favored method. Barr (1994) of course mentioned that classroom environments that provide opportunities for small groups of children to work together to solve problems tend to foster the development of problem solving. However what was observed in the class is not a kind of group work mentioned by Barr (1994).

After following the four procedures mentioned in the above section 4.2.2.1.(B), the teachers ask the students to sit in their groups. In almost all the classrooms there is no space to move the chairs in different positions than the usual arrangement; desks facing the blackboard and the teacher. Even if there is some space to move, both teachers and students don't want to move the chairs for some of the following reasons;

- in the interest of saving time and energy,

- the teacher coming in the next period may not need the arrangement so she/he is not in favor of moving the teachers and the students are obliged to move them back into their original place quickly.

In group discussions, always accompanied by 5-10 minutes of lecture, teachers mention one of the paragraph or the exercise in the text book and ask students to discuss about it. The students form the groups (about 8-10 groups consisting 6-8 students each) and continue to 'discuss' on the subject. Many of the group discussions are opportunities for students' social interaction other than the subject under discussion. Few interested students in the subject ask question each other while others keep whispering among themselves about other issues. Teachers usually stop at the corner of the class, sometimes reading the text book and sometimes casting a brief glance at the groups. The discussion is based on the available text books, usually one for each group.

Reservations exist on group discussion in the part of both teachers and students. Particularly fast learner students are not happy about it. They think it is an excuse for the teacher to take break from the regular teaching process. One cannot also expect a better learning from group discussions without a close monitoring of the groups by the teachers, a well defined group structure (group facilitator and secretary) and a clearly identified discussion points and procedures (Kochhar, 1992).

A principal of one school said that if a teacher uses instructional methods other than the usual lecture method or some kind of group works he/she is looked at as a deviant both by other teachers and students themselves.

4.2.4. Interacting with Learners

This part of the classroom observations had as an aim to see; first of all, if problem solving approach as a whole is being implemented, and second, if it is being implemented, to identify on which step of the approach is the particular class/lesson is concerned and finally to describe how and why the approach/process was being (not being) implemented.

4.2.4.1. Curricular background

Observations show that text books are the only curricular materials available to primary school teachers and students therefore much of the discussions and the exercises in classrooms are dependent on text books. Though the focus of this study is on the instructional aspect, hereunder a table is given to show the diversity of topics covered by four text books of eighth grade. It also partly shows the latitude available to teachers to relate the problem solving approach with these same topics.

Table 9 Topics covered in four text books of eighth grade

No.	Unit	Biology	Chemistry	Physics	Social Studies
1	I	Human Biology and Health	Some Important Compounds	Force	Map Reading
2	II	Humans and Disease	Periodic Classification of the elements	Seeing Things	Natural and Social Environment
3	III	Flowering Plants	Some Important Metals and their Compounds	Heat Energy	Modern History
4	IV	Photosynthesis	Some Important non-metals and their Compounds.	Electric Current and Resistance	Citizenship
5	V	Our Environment	Calculation based on Formula	Electromagnetism	
6	VI	Classification		Introduction to Electronics	
	Pages	213	209	132	190

4.2.4.2. Identifying problems

Problems do not arise out from vacuum (Esayas, 1995). Rather they may be initiated from a variety of sources. Problems are all around the girls and boys we teach. They cannot help but see it. They will see more of it with a little help. As our students themselves are in constant interaction with their environment they observe what is going on in their surrounding. Esayas (1995) also states that teachers too are the most important resource persons either in introducing problems from their experience or reformulating problems raised by students. They are responsible to make problems to their level of maturity and meet their interest. Pizzini et al. (1989) found that "student ownership of the problem is one of the most essential variables resulting in successful problem solving" (p. 7).

In order to see if students can generate/recognize problems, and how much teachers and students have a unity of thought on problems, they were asked to identify the problems in the locality where they are residing. Following one can see an amazing list and consensus on problems.

Table 10. List of problems identified by students in rank.

List of problems in the localities students are residing (Listed in order of severity: the most severe first, the less severe next, so on.)	Students who ranked the problem (%)			
	1st	2nd	3rd	> 4th
Water shortage	48	12	9	12
hunger/ food shortage	21	17	8	7
deforestation	5	13	7	7
lack of health facilities/disease	4	7	2	13
harmful cultural practices	4	-	-	-
lack of rain	3	5	8	9
female genital mutilation	3	1	1	1
dry and warm weather	2	4	4	1
large class size/ shortage of schools	2	23	18	12
transportation problem (road & car)	2	1	5	3
early & illegal marriage (abduction)	1	3	1	3
population growth	1	2	11	1
illiteracy/lack of technological know how	1	1	7	1
unemployment	1	-	-	5
poverty		2	3	3
Others	-	7	12	15
No response	2			

From the table we can observe that 'water shortage' has been ranked as the most severe problem by forty eight percent of the students. Eighty one percent of the students mentioned water shortage as a problem of their locality if we disregard the extent of the ranking. It can also be observed that twenty three percent of the students ranked large class size as the second sever problem. About fifty five percent of the students listed large class size as a problem in one way or another. It is interesting to note that students themselves voice large class size as an obstacle for better learning. Students listed highly varied problems and these problems are aggregated together as 'Others'. Problems like lack of telephone and electricity, lack of text book, lack of housing and clothing are mentioned though with one or two percent of students.

Table 11. List of problems identified by teachers in rank.

	List of problems in the localities teachers are residing (Listed in order of severity: the most severe first, the less severe next, so on.)	Teachers who ranked the problem (%)			
		1st	2nd	3rd	> 4th
	Water shortage	36	6	3	
	Lack of health center (disease, malaria)	17	22	10	
	Early marriage/abduction/ polygamy/ inheriting wives	7	2	12	15
	Excessive right to students and we cannot punish them afraid of evaluation	7	2		
	Lack of housing for teachers	5	4	2	8
	Lack of school facilities (books, chairs…	4	12	10	9
	Lack of secondary school	4	6	3	8
	Lack of respect to teachers/ awareness on education	4		5	
	Deforestation	4			7
	Lack of students initiative	2	2		4
	Unemployment	2	2		
	Lack of pit latrines	2		3	3
	Lack of parental control	2			
	The lack of team work b/n Kebele and people	2			
	Racial discrimination	2			
	Hunger		8	7	3
	Poor school administration		6		
	Harmful cultural practices		4	3	
	Others		22	30	19

Water shortage has again been listed as the most severe problem by thirty six teachers. Here we can see a unity of thought between teachers and students. We can also see that there is consensus on problems like deforestation, large class size and lack of health facilities. Based on this we can say that problems that are related to the life of both teachers and students can easily be identified for the instruction of problem solving approach.

If we summarize the findings of the questionnaires and the personal observations of the localities, we can have few larger categories of problems under which we can enumerate all the others. The problems are so much interrelated that it is clear to see one problem occurs as a result or an impact of the other.

Following is loose category of problems of the localities:

A) Environmental: water shortage, deforestation, lack of rain, dry and warm weather, hunger/food shortage, health problems, lack of energy source, population growth,

B) Cultural practices: female genital mutilation, early marriage, polygamy, abduction, inheritance of wives,

C) School related: no school, large class size, poor school administration, lack of text books, distance from home to schools, school facilities, drop out,

D) Moral: low students' discipline, misunderstanding democracy, HIV/AIDS, lack of respect for teachers, loose parental control

E) Infrastructure: absence of roads, electricity, telephone, flour mill, housing

The above listing has three implications in instructing students with problem solving approach:

1. The implementation of problem solving approach is contextual. In the process of equipping our students with the capacity of problem solving we use our own environment/problems as a context. By doing this we make our lesson relevant to the life of the students and the community and create ownership of the learning process. So the listings prove that students and teachers have no problem in creating a data-base of problems upon which to base the instruction process.

For example a larger percentage of teachers and students have ranked water shortage as the most severe of all problems. Many others also ranked it as the second and third sever problem. It can be seen that the hunger/food shortage affecting the area is caused by the water shortage. The instruction of students with problem solving approach taking water shortage as a central theme could trigger the realization of how problems are interrelated. Water shortage is so central to their life that the scientific steps taken to solve the problem of water couldn't fail to capture students' attention.

The hunger/water-shortage problem is so vivid that the researcher observed two pieces of bread being supplied to each student for breakfast in Adami Tulu Dombosco Catholic Primary School. It was explained by the school principal that if it was not for the breakfast, many would not have been in class to learn. A number of children used to be sick during the morning sessions as they come to school without breakfast after which the school decided to supply the bread.

2. It can be seen that perception of problem itself is culture dependent. Any activity which is scientifically or religiously wrong could be justified as right if it is part and parcel of the culture (Peacock 1986). Until those particular people come into interaction with other culture, they don't realize that they have a different way of perceiving and doing things. It is here that the role of teachers become imperative in helping students identify problems by equipping them with scientific methodologies, even if they haven't perceived the problem since long.

The case of abduction is an interesting example. According to personal observation of the researcher and the view of all principals, abduction is a serious problem in the Woreda. But as it is taken as culture (taken for granted), many don't seem to voice it as a problem. Few responses to questionnaires show that the reason for relatively low number of girls in eighth grades is due to this reason. Schools in some cases have become a haven for girls who would have been targets of abduction. The researcher himself met one of the victim girls and interviewed and photographed her in Abosa Primary School. Her parents already gave their consent to give her as *Gebera*[6], without her knowledge. As she discovered this, she immediately fled to her uncle who, unfortunately, could not help her. She then came to the school to plead for the teachers to do something about it. As the school produced a number of reasons not to assist her, the choice remained for the girl to cry the whole day out of despair. No one was in a position to rescue her out of this threat for the moment.

One teacher, by way of emphasizing the importance of problem solving education, noted in a very serious tone how acute the problem of abduction is. His remark is quoted in the original language (Amharic) directly and then a concise translation is given:

> « ...በእኛ ትምሕርት ቤት ያለውን ከፍተኛ የሆነ አስገድዶ ልጃገረዶችን የመዳር ችግር በጣም እየሰፋ የመጣ ሥለሆነ አዲስ አበባ ለሚገኘው ሴቶች የህግ ባለሞያዎች (ማኅበር) ብታሳውቁልን ካልሆነም ለኢትዮጵያ ሬዲዮና ቴሌቪዥን ብታደርሱልን

[6] Gebera is a traditional way of marriage concluded by payment of bridewealth (Daniel 2003). The bridegroom could be much older than the girl and already got married to more than two wives.

የዜግነት ግዴታችሁን እንደተወጣችሁ ሥለሚቆጠርትውልድ ወሮታችሁን ይከፍላልና አደራዬ የጠበቀ ነው፤ እግዚአብሔር ይርዳችሁ::»

"The problem of abduction of girls has become a very serious problem in our school. It would be considered a meritorious service of citizenship if you let know the problem to Women Lawyers Association in Addis Ababa or to Ethiopian Radio and Television. The generation to come will be indebted to you for this deed. May God assist you."

Abduction is observed to be one of the major sources of student drop-out. As another teacher rightly put it in his response, "we don't have many eighth grade students. This is because the boys abduct girls and the girls are abducted by the boys - ultimately both boys and girls leaving the school to lead an independent life.'

3. The students should be helped to be problematizers in the process of the instruction. According to Freire (cited in Arbab 2000) one can know truly only to the extent that one 'problematizes' the natural, cultural, and historical reality in which one is immersed. To 'problematize' is to engage an entire populace in the task of codifying its total reality into symbols capable of generating critical consciousness and empowering them to alter their relations with nature and social forces. When an outside expert wants to solve a problem he/she steps back some distance from reality, breaks it into and analyzes its component parts, devises means for solving difficulties in the most efficient way, and then dictates a strategy or policy. This approach, Freire contends, distorts the organic totality of human experience by reducing it solely to those dimensions which can be treated as mere difficulties to be removed. Students are instructed with problem solving approach, as indicated in the Education and Training Policy, to be problem solvers of the earlier type, wherever they reside. *(For a discussion of students' attitude towards living and working among their rural families see section 4.5. which has a relationship with problematizing.)*

In classroom observations in no single instance a teacher was observed asking if students have brought problems of their own or proposing his/her own problem related to the locality. It hasn't been also observed while any teacher problematizing the day's lesson or trying to make it relevant to the life and locality of students. The lectures were so confined in transmitting directly what was written in the text books.

4.2.4.3. Hypothesizing

In trying to see how this step of the problem solving approach is being implemented, direct observation of instructions in the classrooms and questions in the teachers' questionnaire were used.

The direct observation of classroom instructions concerned in ascertaining whether there are classroom environments in which students feel free to make hypothesis without fear. Except in two physics classes where exercises were discussed on how to solve the given problems on current and resistance (discussion of electricity for students who might have never watched or touched electricity in their life!!!) no teacher was observed facilitating the discussion of hypothesis, possible causes of problems or different strategies that enable to solve a particular problem.

The other data generated from the questionnaire was whether teachers encourage students or give them the freedom to answer questions and propose new ideas freely and moreover the methods teachers go on doing this. Ninety nine percent of the teachers admitted that they encourage students.

From the list of the ways how teachers encourage students there are no much innovative ways that make students come forward with 'original, unique and creative suggestions' (Appendix One: Table 3). As also confirmed in the class observations a different type of encouragement is not observed except some evaluative words like ok, good or fine when students respond to some close ended questions. Extrinsic rewards also seem to dominate teachers' way of encouraging students which is somehow against the principle of problem solving instruction.

Encouraging students to avoid fear of failure is one good way to empower students exercise hypothesizing. In some instances teachers were observed criticizing students for not studying well. As Callahan and Clark (1988) stated fear and threat tend to shut down the brain mechanism that foster high-level thinking. Moreover harsh, over-strict and fear dominated classrooms may permit learning by rote-memorization; they cut off creativity, original thinking, problem solving, and the building and understanding of major concepts.

In the classroom observations it is clearly seen that teachers hold a 'commanding' position. The lectures and the discussions are highly teacher-centered. The teachers appear as 'all-knowing' pouring knowledge to the minds of students and answering all questions. As already discussed earlier, the most dominant method in classroom instruction is lecture. When students ask questions and teachers always provide answers it doesn't show partnership in the process of inquiry. However other researches show that teachers should have been regarded by students as partners in the process of inquiry in problem solving (Barr 1994).

Observations of student-teacher relations in the classrooms demonstrate that the cultural roles of fathers have manifested themselves in classrooms in the persons of teachers. Teachers direct, approve and disapprove any activity of the students. Students in turn tend to submit their will and personality to the command of the teachers as they do to their parents at home.

Another positive observation made in the classrooms is in terms of teachers communicating their ideas clearly to students. It is highly interesting to note that most teachers are eloquent speakers regardless of the extent of students' understanding. They have no problem expressing their ideas clearly. In all classroom observations the researcher didn't come across a teacher who was in trouble expressing her/his idea whatever it may be.

Related with this another point of observation was to what extent teachers engage students in dialogue. However, as discussed above, teachers usually ask closed-ended

question. In most cases, it is fast learners only that give answers quickly and the teachers don't seem to mind why others are not answering or participating. They immediately proceed to whatever they wanted to say with some approval for the students who provided answers. Answers don't take more than five seconds and don't seem to come out of a critical thinking that took some time to meditate. Teachers don't engage themselves in dialogue with students asking questions like 'why do you think like that?' Particularly the topics in the social studies were good enough to create dialogue, entertain opposing ideas. Despite this, as observed repeatedly, teachers are highly absorbed in delivering directly what is in the text book without any attempt to modify or use a different form of presentation.

Critical thinking and problem solving requires active involvement in the reflective act and goes well beyond the mechanical recitation of information imparted by the teacher or text book. An instructional process that let many of the students be passive listeners doesn't help much in achieving the objectives of the educational policy.

4.2.4.4. Gathering pertinent data

Since students are directly affected by the problems mentioned above, they generally sense the problems. However, in identifying the type and extent of the problem and also to test their hypotheses they must have the know how to collect data on the problems. They must know the source of information and how to get and record the information. Experimenting, reading, observing, making field trips and interviews could be some of the methods primary school children use to gather data.

A. Data from classroom observations and questionnaire

Classroom observations didn't show any kind of discussion or actual activity of data gathering. In order to assess the presence of this capacity in students, in case they might have learned it somewhere before the observation time, they were asked to list the methods they use to gather information on the causes of the problems. About nine percent of the students mentioned that they discuss the problems with the people concerned by way of getting data. About eight percent mentioned that they depend

on radio and leaflets. The rest of the responses are given by a highly low percentage of students (See Appendix One: Table 3). A larger percentage of the students have either given no response or unrelated answers.

Unrelated Responses indicate responses that are totally unrelated to the question. Briefly speaking they are not methods used to collect data. Some of the unrelated responses include; asking people to work more, request the government to solve the problems, afforestation, to go to the court for justice, keep the environment clean, teach the people, etc.

It is a point for further discussion to see that fifty nine percent of the students gave unrelated answers to the question. Even out of the twenty eight percent who seem to give right responses, some of the answers are open for debate. One can't say with what intention students who answered 'asking the government' for information or prepare plans responded to the question. It can also be argued that if they had some good instruction on the methods of data collection, there would have been larger consensus on some of the methods. It is not also very clear that why about thirteen percent of the students didn't respond to the question. However from the survey of the responses to the other questions, one can assume that this group of people didn't even understand the question or are not willing to respond.

As can be observed from the list of 'unrelated responses' (within the 59%), students rush towards suggesting solutions rather than mentioning how to collect information on the problem. This finding seems consistent with the current trend we observe in the outside-school world: suggesting solution or reproducing the same solution to every problem in every area before the particular character of the problem is assessed and known.

Interestingly, in another place a student noted ironically that 'people build water pond when and where there is no rain.' This is a perfect example to show that students (and many other people) rush to 'give solution' before the real problem is known.

B. Experiment

Experiment is one of the methods used to collect data in order to support or refute a hypothesis. As discussed at the end of this chapter, subjects in eighth grade particularly chemistry and physics lend themselves to performing experiments. It can be appropriately argued that experiments are one way of corresponding contents and methods in science instruction for a high degree of success.

Unfortunately, there was no laboratory in any one of the eight primary schools observed. Five schools claimed that they have science kits. The researcher was able to observe the kits in two schools while it was not possible to see the kits in the other three schools as the persons in charge of the pedagogical centers were not available. No school has a trained teacher in how to use the kits. Two principals stated that science teachers use some of the materials very rarely and irregularly. So there seems no chance for students to collect any information through controlled experiment.

C. Reading

One of the ways to collect information is through reading books. And schools need to provide students with books to read by establishing libraries. However, as discussed in chapter three, it is only two schools, out of the eight, that have 'library'. It is only one school (Adami Tulu Dombosco Catholic Primary School) which has some books in the library and well functioning. The other library in Abosa primary school has no books. It has only outdated text books and students are not using it.

D. Observation and field trips

Students were asked if they had ever gone to field trips/visits and if they went to field visits to describe what they did in the field and whether they have reported it back into the class.

Table 12. Students' level of response about their field trips (%)

How many times your teachers took you to the field for a visit and observe things in the last semester?	>10 times	6-10	1-5	They never took us to the field	Other comment	No response
	0	0	24	69	1[7]	6

As surveyed by the questionnaires and principals' interviews teachers in six schools (75%) have never taken students to planned field trips. Teachers lack of interest, lack of enough time due to the pressure for content coverage, lack of budget in the part of the school and students' low economy to cover expenses by themselves stand as main reasons for the inability to do the trips. However the students in the two schools, who have been taken to the trips, seem to enjoy and learn much out of it (See Appendix One: Table 4). The comment given by one student summarizes what joy students might have derived during their trips:

> It is interesting to learn together with the teacher. We have always liked and enjoyed activities outside classrooms.

Having in mind the importance of reflection on field visits and experimentation, students were asked if they had reported to the class whatever they observed. The following table shows there is hardly any reporting and reflection on observations made.

Table 13. Students' level of response on reporting to their class about field visits

Did you report about the visits in the class?	Yes		No		Other Comment		NO response	Total
	12	8%	10	6%	-	(%)	138 (86%)	160 (100%)

As understood from the interviews and the informal discussions the researcher had with teachers and students, one of the schools has taken eighth grade students to the nearby soda ash factory for a visit (in chemistry lesson), while one of the school took the students to the nearby Ziway lake (biology session). Apparently the first group went there to observe the process of production of soda ash while the second group went there to observe the birds and plants of the area. It could also be understood that

[7] In 'other comment' section one student commented that he doesn't know the reasons why the teachers are not taking them to the field.

some students have reported about the visits to the class. These are some good instances that students were taken to a field with a purpose and clearly defined goal. Of course it could be another point of research how much field trips are organized (and controlled) and benefit students as required. But such kinds of visits need to be encouraged, with more frequency, in the instruction of students with problem solving approach.

E. Interviews

As can be observed in Appendix One: Table 3, of all the methods of data collection students seem to prefer interviews (asking other people). It is not surprising to encounter this preference in a society with oral tradition. The question is how much students can do mature interviews and how precisely they record the findings.

Classroom observations didn't show any kind of reporting, discussion on observations (data collected) or even checking of any assignment.

4.2.4.5. Arriving at a conclusion and choosing the best solution

Once data are collected students should be instructed in ways how to interpret data and arrive at a conclusion or decision. Students must be aware of some techniques (criterion) by which to weigh the validity and practicality of the conclusion and the decision for action. Moreover there must be practical actions based on the findings to assist students develop to make informed decisions and actions.

Based on this students were presented with two questions: the first one aimed at finding what their knowledge of criterion look like in judging the best solutions and the other is what steps they take to arrive at a conclusion in ultimately solving a particular problem. The later question consisted of two kinds of problems: the first problem is covered in biology text book for eighth grade and the other problem is the problem that highly affect the Woreda.

A. Choosing the best solution

The question forwarded in this respect was how the students choose the best

solution if there are many solution paths to solve a particular problem. Accordingly thirty one percent of the students provided correct answers while another thirty eight percent of the students provided incorrect or unrelated answers. Thirty one percent of the students didn't provide any response. The correct answers included; choosing the easiest path, choosing a solution agreeable to the people and choosing the scientific method. Incorrect or unrelated answers included working together, using time, asking the government, etc.

B. Steps taken to arrive at a conclusion in solving a particular problem.
Below there are two tables showing what students responded to two questions that require them list the steps they take to solve a particular problem. The intention was to see if students arrive at solutions or conclusions following the proper steps of problem solving.

Table 14. List of students' response of the steps they take in solving a disease problem.

	A certain rural locality faces different kinds of disease more than other localities. If the people approach and ask you to solve these disease problems, what are the steps that you take to solve these problems?	Frequency of response
	I tell them to go(inform) to the health center	39
	I tell the people to raise the level of hygiene	22
	I teach them to protect themselves from disease	16
	I make a research on the type of disease (to ask the people about it)*	6
	I tell them to stop sex, to prevent AIDS, Use condoms, one to one	6
	I tell them to add chlorine into the water before they drink it	5
	First I will make a research on the type of disease and then try to find solutions*	4
	They must burn the dirt in the area	3
	Search for solution to prevent it	3
	If I understand the problem I will give idea	3
	To isolate the sick person	3
	To educate the people on the causes of the disease	2
	Find the way how it is transmitted*	2
	I would assist them if I were a doctor'/if I had money	2
	Report to the concerned body	2
	To give money	1
	To discuss with the people*	1
	To avoid the causes of malaria	1
	To take medicines	1
	To tell them to eat balanced diet	1
	Totally unrelated answers like; The people are illiterate, There is no money, We must plant trees, There is no enough land	15
	No response	31

Table 15. List of students' response on steps they take in solving a water shortage problem.

	Another rural locality had water shortage. If the people approach and ask you to solve the water shortage problem what are the steps that you take?	Frequency of response
	Prepare water ponds	27
	Inform the government (Woreda) to look for us water	23
	To dig water well	13
	To discuss the problem with the people, to reach at a decision, and contribute labor and money to solve the problem	10
	To tell them to boil the water from the river/water well	9
	Plant trees to attract rain	8
	To inform the people that deforestation causes water shortage	4
	I will help what I can	4
	If we cannot do it we consult the government	3
	To tell the people to drink clean water	3
	To ask the people to collaborate with the government	3
	To educate the people on the protection and effective use of water	3
	Build water dam	2
	To inform the people where water is available	2
	To tell people to add chlorine to the water	2
	To study and plan how to get water and reflect on the plan monthly	1
	To move the people to places where water is available	1
	To supply water from closer sources	1
	To beg investors for help	1
	Teach people how to conserve water	1
	No response	31
	Unrelated answers (I will go to town, It is a pity, No one is afraid…)	13

A close study of the above two tables demonstrate certain fundamental truth about the status of students in terms of their knowledge on problem solving process and capacity:

It is only about 13 (8%) students at least mentioned that they have to do some research on the type of disease before they prescribe any solution, however, no one of them didn't describe what they will do after they knew about the disease. It was expected that students mention some of the steps they take to solve the problem once they knew about the disease. Nineteen percent of the students didn't respond to the question while nine percent gave totally unrelated answers (Refer Table 14). Otherwise the majority of the students (about 64%) gave prescriptive responses before they tried to know what actually the problem is and its extent.

In the second case no student mentioned any thing about knowing/identifying the source of the problem before taking other problem solving steps. Nineteen percent of the

students didn't respond to the question while eight percent of the students provided totally unrelated answers (Refer Table 15).

In both tables the highest frequency of response ('I tell them to go to the health centre, I tell the people to raise the level of hygiene or Prepare ponds, Inform the government, To dig water well, etc) show that students rush towards prescribing solutions before the details of the problem are known. These responses seem to be resulted from the high influence of sources of non-formal education like the media. The media news of building water ponds everywhere in order to alleviate water shortage is currently on the air. The media hammers students' minds in this respect rather than the formal education they are getting in schools. Building a water pond for example, as essential it is, must first be supported by a research as to its feasibility for the particular area. This and almost all of the other responses listed in the tables demonstrate that students, as discussed earlier, tend to propose and execute solutions before there is a thorough investigation on the problem. And such practices aggravate problems rather than solving them.

Another important finding is the high frequency of dependency syndrome students illustrate in their responses. Responses like telling people to go to health centers, reporting to the concerned body or informing the government, to beg investors show that students lack the knowledge and the confidence to investigate and solve the problems by themselves. They tend to transfer the responsibility to others particularly the government. Such notions are most probably the extension of their parents and communities who think that it is the responsibility of the government (someone out there) to solve every problem in every household. Ordinary or uneducated people know they have the options to go to the health center when they are sick (without the help of their educated children). The students should have other ways to assist them.

Another tendency observed in the tables is students' wish to discuss problems with the people and arrive at a decision. This is what Kebele officials do in most rural localities whenever they are confronted with some kinds of problems. Time and again it is

witnessed that students are much dominated by the current thoughts and actions of the outside world than what they learn in the 'school world'.

In summary, students seem to have a vague knowledge on problem solving approach. No student, unfortunately, had presented relatively complete steps of problem solving process. The given responses in the tables don't appear to be a product of systematic learning. Much of the responses rather give the impression that they come out of the influence of knowledge sources other than formal education.

Classroom observations didn't show any discussion on collected data or, at least theoretically, how to evaluate the practicality of any decision.

4.2.5. Evaluating the Effectiveness of Instruction

4.2.5.1. Assignment

Instruction in problem solving approach can be supported and evaluated by different assignments students are given. It has been suggested in the literature review that with the shift in the instruction of problem solving approach the method of evaluation also needs to shift. In this respect classroom observations and teachers' questionnaire included what kind of exercises and assignments are given to students.

Ninety eight percent of the teachers admitted that they provide assignments to students. However, as confirmed in the questionnaires and classroom observations the assignments are highly based on the exercises given in the text book which are not much related with problem solving approach. Some of the group or project works mentioned are not also given as home-take assignments; rather they are some exercises which are done as classroom activities taken again from text books. The classroom observations and text book analysis show that assignments are not organized and administered in such a way that they fit into one of the steps of the problem solving process. (*For a list of the teachers' responses on type of assignments please see Appendix One: Table 5*)

4.2.5.2. Students confidence in solving problems

After students were asked to list the problems in their localities (Table 10), they were asked if they think they can solve these problems. Following is a table showing their responses:

Table 16. Students level of response about their capacity to solve problems

	Do you think you can solve the problems you listed?	Yes		No		Other Comment	Total
		133	83%	22	14%	5 (3%)	160 (100%)

It is interesting to see how eighty three percent of the students think that they can solve the problems they mentioned. One student commented that he can solve the problem provided the necessary facilities are there. The other four simply marked the 'other comment' category and jumped without any comment.

As indicated by the above tables, students always have in mind some unexamined solution to every problem. It is possible that they take an action to solve a problem before they knew what the problem exactly is. The next question and response demonstrate this stated fact:

Table 17. Students response to a question of procedure they follow in solving any one problem.

	If you answer 'Yes' to (the) question ..., would you please list the *procedures* you can follow or apply in solving any one of the problem?	Frequency of response
	Plant trees	19
	Protecting the forest	17
	Asking the government for help	15
	To teach the people	14
	Working together	11
	Opening secondary and tertiary level schools	8
	Learning different things	6
	We want you to solve our problem	4
	Family planning	4
	First to know the cause of the problem (to identify the problem)	4
	Water problem	4
	Applying what we learned	3
	Living with the people and helping them	2
	Selective seeds	2
	Searching solution with my family	1
	Eliminate malaria	1
	crop rotation	
	No response	14
	Unrelated answers: food shortage, if I have money I will do many things, female genital mutilation, everybody has to be educated...	42

The intention in asking this question was for students to list the procedures they follow in solving a certain problem. It is in a way a reinforcement of the question asked specifically about the steps taken in solving a disease or a water shortage problem. Unfortunately, it is only four students who responded steps essential in solving a problem. However they didn't give a complete list of procedures or steps they may follow in solving the problem.

As mentioned earlier, students rush towards suggesting a solution before mentioning what procedures they follow to arrive at a solution. Even when suggesting a solution a sizeable (twenty six percent) number of students suggested a solution not related to the problem they mentioned. A student for example listed water shortage as a problem but in describing the procedure that one needs to follow to solve the problem, the student said that the school needs more teachers.

4.2.5.3. Teachers assessment of students' capacity to solve the problems of their locality

Since many of the steps in the process of problem solving approach were not observed in the classroom instructions, the teachers rating of students' problem solving capacity become imperative. The following tables show teachers' beliefs in this respect and why they entertain such beliefs:

Table 18. Teachers' belief in the capacity of students to solve problems

	Yes		No		Other Comment		NO response	Total
Do you believe that eighth grade students are being equipped with the necessary knowledge and skill to solve these problems?	21	14%	117	77%	11	7%	3 (2%)	152 (100%)

The table shows that seventy seven percent of the teachers don't believe that students are being equipped with the necessary knowledge and skill to solve the problems of their localities. It stands in contrast with the students' belief that they can solve the problems (section 4.2.5.2).

The reasons given to justify why the teachers answered 'no' provide an insight into some of the challenges facing students in developing the necessary capabilities to be problem solvers. One teacher remarked, in a witty manner, 'how can we expect the students to be problem solvers when in practice they are instructed with the old policy – ordinary academic education! They might probably serve as elected members of Kebele administration.'

In the table (Table 18) 'Other Comment' category a teacher who responded 'both yes and no' stated that resource and good governance as preconditions if we want the students to solve problems. Another teacher commented that the capacity of students as problem solver differs from place to place and situations to situations. He further added that, 'in our case 8th grade students are problem creators rather than problem solvers.' Another teacher said, 'we don't see any capacity and interest in the students to solve the problems of their locality.'

Teachers were asked to provide reasons for their belief in the capacity of students to solve the problems of their locality. From the list (Table 19) it can be seen that some of those teachers who believe that students have been equipped with the capacity to solve the problems stated that students can do this if they work in teams or supported by the governments.

In the list of reasons provided by who said 'no' the reason 'students didn't get enough knowledge' has got the highest frequency. However, viewed from the point of contribution teachers make in the learning process, this and some of the other responses indicate that teachers themselves didn't play their role well.

Table 19. List of reasons why teachers answered 'yes' or 'no' when asked about their belief if students are being equipped with problem solving capacity

	Would you please give reasons why you answered "Yes" or "No" for the above question (Table 18)?	Frequency of response
	Yes	
	Students can solve the problems through consultation	6
	Students have the skill and the knowledge but they need the collaboration of the government and the people	3
	They are better than the other uneducated rural people	3
	Since they are instructed with problem solving method they can solve the problems	3
	Because of their educational background	2
	No response (out of those who said 'yes' for the previous question)	4
	No	
	The students didn't get enough knowledge (due to poor school conditions) and/so the society doesn't accept them.	29
	Since the students are brought up in a bad condition it is good if they can solve their own problems (they are immersed in the problems, their behavior itself is not changed).	15
	The problems are diverse and beyond their capacity, so can't be solved by 8th grade students	11
	Lack of bright future, initiative, focus and discipline	6
	Let alone the students, the teacher himself (the society itself) can't solve the problems	6
	Lack of library, text book…and the lesson is highly theoretical	6
	The policy and the ground for implementation are not compatible	5
	Because there was no enough support to the teachers	4
	They need the collaboration of the people, they can't do it alone	4
	Because of harmful cultural practices	4
	Others	13
	No response (out of those who said 'no' for the previous question)	14

4.2.5.4. Principals rating of the school and eighth grade students

Principals were asked how they view the capacity of eighth grade students to solve the problems of their localities. It is only one principal who stated that the students are in a better position than the local people to solve the problems if they get out side assistance. Otherwise the other six principal and one vice principal share the idea that eighth grade students don't have the capacity at all to solve the problems. One principal particularly voiced the sentiment of the other principals by indicating that the students have two alternatives while they complete eighth grade. The first possibility is to pursue secondary and higher education and prepare themselves to solve their own personal problems. However, there is a highly limited opportunity to fulfill this possibility. The second

option remaining for them is to join farm life back home after dropping out at this level or completing eighth grade. Once they are back at the farm/home, they fall under the spell of tradition rather than become problem solvers or change agents.

4.3. Students' Attitude towards Living and Working in the Rural Areas

4.3.1. Students as Problematizers

Based on the need for problematizing stance, students were asked if they are interested to live with their parents in the rural area as they finished schooling. The following table illustrates that fifty four percent of the students are interested to do that.

Table 20. Students' interest in living in rural area with their families

	Yes		No		Other Comment		No response	Total
Would you like to return and live around your rural families after you finished your schooling?	86	54%	57	36%	5[8]	3%	11 (7%)	160 (100%)

It can be seen that at least at this grade level the greater percentage want to stay in the rural area. It is interesting to see that most of the students' reasons to stay in the rural area is with the pure motive 'to solve the problems of family and the society'. They believe that they have the responsibility of educating their communities 'modern ideas' (See Appendix One: Table 8). Almost all the responses in this category are valid reasons and show positive attitude towards living in the rural areas. It would have been wonderful if their interest was matched by a proven and sustained capacity to solve problems. Despite this interest and motive, it is possible that the trend shifts to 'no' as the grade levels increase (Daniel, 2003).

In another category students were asked to enumerate the reasons why they don't want to stay around their parents. Many of them looked rural areas as an embodiment of problems. They indicated that the rural areas cannot at least provide basic necessities. It is noted that those who have developed the notion that towns provide employment and better life and so want to stay in town intend to assist their families from town. There are repeated suggestions that wishes to a better life include both nuclear and extended families (*Please refer Appendix One: Table 8 for more list of responses.)*

[8] One student said 'I want to live in both'.

4.3.2. Students as out side Viewers

A question about whom the students expect to solve the problems of the rural areas was asked. It was forwarded for those who said they don't want to stay in the rural area. However it has been shown that those who wanted to stay in the rural areas also responded to the question usually saying 'myself.'

This was an instance where some of the students showed so clearly that they expect someone else to solve the problems. As discussed earlier, out of those students who expect someone else to address the problems the majority feel that the government has to do something. They also expect the Kebele committee to do something about problems as they feel that the Kebele is the local government or an extension of the federal government (*See Appendix One: Table 10 for the list of students' response in this respect).*

This is in many ways consistent with what we observe in many of the people who are out side school. We observe that people haven't developed the feeling that there lies a power within them to face and solve problems. People in the media or during Kebele meeting are heard blaming the government for not doing the tasks that can be easily done with the collaboration of neighborhoods. Or they are heard appealing the government for more involvement in their daily lives. People couldn't perceive the existence of government as facilitator of development while the power to solve problems is in their power. It is sad to see how this wrong feeling is nurtured in our schools.

The lack of self-initiative has also been observed in the country's old educational system as clearly reiterated by the document issued by the Ministry of Education (February 2002:12). It states that:

> ... the great majority of students that went through the system, were incapable of being employed in jobs that require technical skills, much less rely on their own initiative to create remunerative work projects. In addition, because they fancied themselves as educated elite none of these students would ever consider working in the fields with poor farmers.

Whether the knowledge and attitude of students required to work 'in the fields with poor farmers' have been developed after ten years of implementing the new policy is worth examining.

4.4. Opportunities and Challenges in the way of Implementing Problem Solving Approach

4.4.1. Understanding the Policy

In the last analysis the effectiveness of an innovation or a technology is measured by the extent of its utilization. Any systematically applied human reason must operate in a collective social context. Therefore the practical invention which originates anywhere does not qualify as an innovation unless it is expressed in a tool, process, or object which can be used by others (Arbab, 2000).

Based on this we can argue that the new education and training policy of the country also must be able to improve the ability of teachers and school administrators to control social forces which surround them as they constitute the largest bulk of the implementers. The viability of this policy is highly determined by the common understanding and enthusiasm of these groups of people. Without this understanding and will the policy can not be implemented regardless of any popular support or its innovativeness. Therefore a question was forwarded to teachers to this end.

Table 21. Teacher's belief of their own understanding about the problem solving approach

	Yes		No		Other Comment	Total
Do you think the problem solving approach suggested in the education and training Policy is understood well by the teachers?	47	31%	97	64%	8 (5%)	152 (100%)

The finding indicates that a larger percentage of the teachers already feel that there is no proper understanding of the policy among themselves. In fact three teachers who marked 'other comment' said that problem solving approach is totally strange to them.

Any innovation tampers with prior values and norms. As a result teachers are suspicious of new policies and guidelines as they know it will directly affect their lives and the lives

of their families. It is only when they make sure that it is to their advantage that they think and work in its favor. The reasons for 'no' answers reveal that either there is real lack of understanding on the part of teachers (for lack of training) or they understand the policy but have not developed positive attitude towards the policy in one way or another. It is also possible that teachers are not problematizers themselves; taking the problems as their own and exploring solutions in partnership with the students and the administration.

In informal interactions with teachers many of them still complain about their 'deplorable situation' (MOE, 2002) and feel that they are the less favored sector of the society. Because of this feeling many of them don't take interest in creativity and overcoming challenges. The survey of the teachers profile and responses show that they don't seem to fit in the picture given by the same document issued by the Ministry of Education.

Small percentage of teachers believe that there is understanding on the policy however they didn't deny that challenges exist in practicing the policy. The lists in this category look a fair treatment of the objective conditions that exist in schools. *(Refer Appendix One: Table 6 for the list of reasons concerning the teachers understanding on the policy).*

A comment given by one teacher summarizes all what has to be said in terms of the understanding of the policy particularly the problem solving approach:

> First of all there is inadequate training at the training institution level. Once we started work, there is no in-service training. If ever there is an opportunity for an in service training, it is given to people favored by the administration ignoring the principle of justice. The changes in the education system are not holistic; therefore we spend most of our time sitting in the class and lecturing which is damn boring.

4.4.2. Practicing the Policy

Beyond the understanding of the policy, the teachers were asked if problem solving approach is being implemented based on any form of understanding. The following table shows the level of responses and their justifications:

Table 22. Teachers' view on whether problem solving approach is being implemented in their schools

Do you say that problem solving approach is being implemented in your school regardless of the extent of the awareness?	Yes		No		Other Comment		No response	Total
	46	30%	98	64%	1[9]	(1%)	7 (5%)	152 (100%)

There is an amazing relationship both in theoretical and practical aspects of understanding and implementation. Those who believe that the problems solving approach in the policy is not understood well also believe that the approach is not being implemented. In actual fact it is very difficult for teachers to implement what they don't know themselves.

Moreover teachers were asked to reason out why they answered 'yes' or 'no'. Their responses (Appendix One: Table 7) give more insight into the challenges impeding the implementation of problem solving approach in schools. Lack of training still has taken the lead in the list of challenges in the way of implementing problem solving approach. Regardless of the majority's view that a number of challenges exist, few teachers see positive development in the instructional process as there are efforts in the way of active learning.

4.4.3. The Capacity of Schools to Equip Students with Problem Solving Capacity

The whole school structure and facilities are some of the factors that enhance or impede the implementation of problem solving approach. Teachers were asked to rate the capacity of rural schools in terms of equipping students with problem solving capacity.

Table 23. Teachers' rating of the capacity of rural schools in equipping students with problem solving competence.

How do you rate the capacity of rural schools to equip students with problem solving competence?	Very High	High	Medium	Low	Very low	NO response	Total
	4 (3%)	26 (17%)	47 (31%)	25 (16%)	42 (28%)	8 (5%)	152 (100%)

Immediately after the above question teachers were asked to justify their responses. Following is the list of the answers they gave. For the purpose of convenience those who

[9] We cannot judge its implementation before we know it what it means.

answered 'very high' and 'high' are aggregated in one place as 'medium', 'low' and 'very low' are in another place.

Table 23.1 Teachers' justification why they categorized the capacity of rural schools in equipping students with problems solving competence as 'Very High' or 'High'.

	If your answer is "Very High" or "High" to question ..., what are your reasons to answer that?	Frequency of response
	Since the school tries its best to educate the children	8
	If their own problems are solved they can solve problems	7
	Through clubs, engaging them in extra school works during their break time.	5
	If the student is instructed in a way that he practices what he learned in the school	4
	There is no any training on problem solving approach, however the school encourages teachers to use different student centered methods.	2
	Because we are trying to solve the problem of the school through large class size	2
	The teacher works according to his/her capacity: it is no use to inform and burden him/her by telling what is in the policy	1
	No response	5

The responses in both tables demonstrate that there is always effort in the part of principals and teachers to give a better education to children. But there are challenges, at times seemingly insurmountable, both at school and students level to give, receive and practice a better education.

Table 23.2. Teachers' justification why they categorized the capacity of rural schools in equipping students with problems solving competence as 'Medium', 'Low' or 'Very low'.

	If your answer is "Medium" or "Low" or "Very Low" to question ...what are your reasons to answer that?	Frequency of response
	Lack of budget	26
	Lack of school facilities	21
	Large class size	17
	No trained teacher	10
	Students low interest in schooling/learning coupled with students unbridled democracy	7
	Lack of parental control and awareness	5
	The school is trying its best. However once the students are out of school they tend to be engulfed with the existing system.	5
	Lack of students' initiative	5
	Because teachers are not accepted by the society	3
	Absence of library	3
	There is no proper monitoring of students	1
	Low economy of parents forces students to spend less time in schools	1
	Because of their young age	1
	Teachers and principals are not interested in solving the problems of schools; they conduct their work for the sake of getting salary	1
	No response	13

The lists and their rankings are self-explanatory. Observations and interviews with the principals also confirm that the second categories of responses are real obstacles in the way of implementing problem solving approach.

4.4.4. Teachers' Training

One of the recurring themes among the challenges in the way of implementing problem solving approach is lack of teachers' training. The following tables show issues related to teachers' training:

Table 24. Teachers' level of training on problem solving approach

Have you got any training on the instruction of students with problem solving approach?	Yes		No		Other Comment		Total
	38	25%	103	68%	11	7%	152 (100%)

It can be seen that a large percentage (68%) admitted that they had no any training on problem solving approach. Out of those who claimed they had training some of them commented that the training that they got in the teacher training institutions was not enough as it is highly theoretical and is done in rush. Some also commented that teachers are willing and ready to get training; unfortunately, they say, there is no one to provide it.

The next question forwarded to those who claimed that they have training on the approach is where they got the training. From the responses it can be concluded that pre service training for teachers compose the main source of training in their profession.

Table 25. List of places where teachers got trained

	If your answer to the question is "Yes" where did you get the training?	Frequency of response
	In the TTI/C	18
	In our school/cluster	12
	No response (out of those who said 'yes')	8

From the list of the responses we can also see that the concept of clustering has become as important as the teachers' training institutes. It could be well organized that it becomes a centre of training and inspiration to teachers included under it. In fact when teachers were asked to specify if the type of training they got concerns problem solving

approach almost all of them stated it is something else than the approach (See *Appendix One: Table 11).* It can be deciphered that much of the training or workshop conducted are on student-centered approach in general and continuous assessment which teachers didn't practice with the excuse of large class size.

According to the principals there was no any special training both at cluster and school levels on how to instruct students with problem solving approach (training beyond what the teachers got in teachers' training institutes).

However, teachers were asked to state the helpfulness of the training they got in terms of instructing students with the problem solving approach:

Table 26. Teachers' rating of the helpfulness of their training in instructing students with problem solving approach.

If you have a training, how do you rate its helpfulness in instructing students with the problem solving approach?	Very High	High	Medium	Low	Very low	No response	Total
	8 (21%)	13 (34%)	9 (24%)	-	4 (11%)	4 (11%)	38 (100%)

Table 27. Teachers rating of themselves to what extent they were affected for lack of training on problem solving appraoch.

	If you didn't get any training, how did this affect your capacity to instruct students with problem solving approach?	%
	a. It affected me very highly.	16
	b. It affected me highly.	23
	c. It affected me moderately.	19
	d. It affected me little.	16
	e. It hasn't affected me in any way.	11
	f. I have never wanted to use the approach so I didn't feel the problem	2
	g. Other comment	2
	No response (out of those who claimed to have no training)	12

Given the importance of the role training play in the life of professionals it is not amazing if large number of teachers state that lack of training affected them very highly or highly. We clearly see the importance of bringing the innovations enumerated in the education policy into the curriculum for teachers' training institutes. Of course, some teachers commented that they don't have any training on problem solving approach, however, they said, they are trying to teach the way they understood it (and as a result they cannot rate its helpfulness!)

Definitely it can be observed from the above two tables that any kind of training improves teachers performance or at least it makes them feel better about themselves.

4.4.4.1. Teachers' Training Institutions

Having observed that a larger percentage of the teachers are trained in Adama Teachers College, Adama town and Assela Teachers Training Institute, Assela town, a visit was made to these institutions.

The objective of the visit was to have a cursory view of the program of teachers' training in both institutes. The activities of the trip included mainly talking to the officials of the institutes, visiting the Education/Pedagogy department of the institutes, discussing with instructors of education courses and examining prospectus on the institutes and course outlines and text books on teaching methods.

The inquiries made largely revolved on the situations that existed before this academic year (2003-4). This is because both Adama Teachers College and Assela Teachers Training Institute have highly reorganized their course structures as they started to accept 10^{th} grade complete students (which was used to be 12^{th} grade complete students). The current courses focus on subject methodology rather than providing content on various disciplines on one hand and method on the other. As a result classroom observations could not also be made to have a glimpse of what had expired before this academic year.

I. Adama Teachers College

In Adama Teachers College the first focus was in getting the course outline on "General Methods of Teaching (Educ122)" as it is directly related with the research questions: the Implementation of Problem Solving Approach. In the course outline there has never been mentioned Problem solving approach under Methods of Teaching (Course outline pp 2). The nine methods listed and discussed briefly are: Lecture, Demonstration, Discussion, Discovery, Study Trips, Role Playing, Team Teaching, Questioning and Non-verbal

Behaviors in the Classrooms. Education course teachers have informed the researcher that they treat problem solving approach under the 'Discovery' method.

The course manual 'A Course Material on General Methods of Teaching' written for this particular course by two instructors of the Department; Dessalegn Fufa and Fetene Regassa (2002), was also examined. Though the instructors, in a verbal discussion, told the researcher that they include Problem Solving Approach in Discovery Method, nothing is mentioned about it in the course manual. The problem solving process is not given in the text. The teachers themselves admit that let alone with problem solving approach, trainees could not be instructed well with the methods mentioned and discussed in the course outline. This is largely because of the emphasis on content coverage, the high burden on the instructors (with average class size of 50) and students themselves. Fortunately they included Problem Solving Approach in their new course outline which is beyond the scope of this study.

II. Assela Teachers Training Institute

In Assela TTI also, the primary focus was to get the course material on "Pedagogy" as it is directly related with the objective of the study. However, the courses had no course outlines. It is more like a high school where teachers submit lesson plans regularly and teach with those plans with the support of a text book. Fortunately, the text book for pedagogy briefly treats, in about two pages, problem solving approach under the different teaching methods section. It defines problem solving, depicts the process/steps in problem solving, enumerates some strength and limitations of the approach and finally lists the situations for using the approach.

However as some of the teachers informed the present researcher, the teaching activity is more of theoretical than practical. There is no practice or project based on the approach and teachers don't have the time and energy to help students monitor as they use this approach in teaching practices.

4.4.5. Supervision and support given to teachers

4.4.5.1. Cluster

One of the efforts being made at Woreda level to improve the teaching-learning process is to organize schools under cluster. It is supposedly to become a learning ground (particularly on student-centered approaches) to the principals and teachers under the cluster. Therefore a question was forwarded to teachers as to the advantages they get out of the cluster in terms of training The following table illustrates their responses:

Table 28. List of advantages teachers get out of cluster centers

	If your school is organized under cluster centre what kinds of advantage did you get out of it?	Frequency of response
	Sharing school experience (on the teaching process, learning aids, clubs, and the possibility of working together for a common goal)	123
	We had sport games	8
	About how to do researches, civil service reform, civics education	6
	To share learning aids	6
	No advantage out of it	6
	Just conducted workshop once /no series of advantages	3
	Teacher got to know each other	2
	No response	10

As indicated in the list, there is no strong suggestion to conclude that teachers have got training on problem solving approach at cluster level. Discussions with principals revealed that what they mean by sharing experience among schools is the group trip made to a different school to visit the same activities taking place there. It is also sometimes a forum for political cadres to address teachers of different schools in one place on matters of political concern.

4.4.5.2.. Other support

There was also a question to find out if there are other supports given to the teacher from other sources in line with instructing students with problem solving approach.

Table 29. Teachers' responses on whether they get out side assistance in their effort to use problem solving approach in classrooms

	Is there any support by outside sources to assist you to use problem solving approach in the instruction of your subject?	Yes		No		Other Comment		Total
		41	27%	108	71%	3	2%	152 (100%)

As can be deciphered from the table the majority of the teachers didn't get any support with respect to instructing students with problem solving approach. In fact one teacher commented bitterly that there are of course those who come from the Woreda to 'create' not 'solve' problems. Few other teachers indicated that no one looks around to assist.

For those who said that they have got support, another question was forwarded to know the source and the manner of the support. They provided the following responses:

Table 30. List of sources of assistance to teachers

	If you answered "Yes" to the question, would you please mention who assisted you and the manner of the assistance?	Frequency of response
	The Woreda education bureau	14
	The principal and/or the Department	9
	English Language Improvement Program	5
	Through Cluster and English workshop	3
	A book found from Rift Valley	2
	Not response (out of those who said 'yes')	9

The response with the highest frequency indicates that the Woreda Education Bureau assists teachers in their effort in the teaching process. The researcher had also the opportunity to meet some officials from the Woreda Education bureau in two schools while they were visiting the schools with the objective of providing close support to teachers and principals.

All in all the responses show that there is a limited assistance both within and without the schools.

4.4.6. Classrooms/Facilities

The classroom observations and many of the teachers' and students' responses confirm that the following are additional challenges to teachers in the implementation of PSA. It is important to note here that as long as teachers feel these are their challenges and, no one is there to engage in dialogue with them to explore possibilities of overcoming them the challenges remain without being tackled.

4.4.6.1. Large class size

The average class size in lower grades (1-4) in many of the schools is 150. As the grade level increases (5-8) the average class size starts to decline as many students drop out reaching about 62 in eighth grade. Unfortunately since the students had poor instruction in the previous grades, the repercussions persist and stultify the effort at higher grades. The goal to reduce teacher/student ration to 1:50 in primary schools is beyond expectation in the near future (MOE, 2002).

4.4.6.2. Classroom conditions

Coupled with the number of students, the poor classroom conditions in rural areas affect the learning process. Most of the rural schools are not neat, well ventilated and lighted. As there are no good fences around the school compound, domestic animals particularly goats roam around classrooms: sometimes trying to enter the class.

4.4.6.3. Budget

All the principals, except for the Adami Tulu Dombosco Catholic Primary Schools[10], admitted that there is a high shortage of budget in the schools for various purposes. Though basic stationery is supplied from the Woreda Education Bureau, it would not be enough to cater for the needs of teachers in their student-centered instructions. Whenever the schools face insurmountable problems, they call parents' meeting and explain the situation to solicit contributions which the parents do. Some principals believe that this is contrary to the government's wish to make primary education free.

4.5. Text book Analysis

The development and usage of syllabus and text books consist of a larger proportion of curriculum development and implementation process. Both are also powerful forces in classroom instruction and reflect the dominant social, political, and moral values that pervade at the time of their publication (Behar, 1994). They provide a level of content expertise in an organized and logical format that few teachers possess. They facilitate the teacher's instruction by mapping out the journey that the teachers and students will share.

[10] The school is owned by the Catholic church and as a result the budget comes from the church.

Text books have been found to be a central force in the process of acquiring knowledge whereby they form both the hub and the link to other sources, supplementary materials and experiences that will render the curriculum an active and relevant experience for all students. The Ethiopian Education policy seemed to be cognizant of this fact and so 'not only have there been changes in content, but also there have been changes in the manner of their preparation' (MOE, 2002).

In light of this, text books are expected to be highly helpful to both teachers and students in the instruction of problem solving approach. In order to ascertain this assumption text book analysis was made on science text books of eighth grade; namely, Biology, Physics, Chemistry and Social Studies.

As discussed in Chapter Three the objective of analysis focused on two important aspects:

A. The first one is looking for the presence of any direct discussion on problem solving process in content presentation of each unit in each subject,
B. The second aspect is checking exercises and experiments if they are in line with problem solving approach as applied to the context of rural schools.

All the text books are prepared by Oromia Curriculum Development and Research bureau (written based on the syllabus given by the Institute of Curriculum Development and Research) in 1992EC except the social studies prepared one year earlier.

4.5.1. Biology

Order of Presentation: In all the units we find that first long readings of facts and theories on the topics, interspersed by few questions[11] that have indirect approach to the topic, and finally a list of review questions.

[11] The questions mentioned are the kind of exercises that can be answered indirectly from the presentation of the facts.

Type of Exercise: There are three types of exercises constantly appearing in all the units. The first types of exercises are the kind of experiment or project typically on a 'cook book' approach. The second types of exercises are questions that can be answered indirectly from the presentation of the facts. The third types of exercises are review questions at the end of each unit, largely dominated by closed ended questions: True or False, Matching and Choose the Best Answer.

The only questions that are pertinent to problem solving approach are the questions that ask;

1. to find the possible causes of the diseases rampant in the students locality, (p.61)
2. to examine plants and grass infected with disease (p. 71)
3. to report how HIV/AIDS is transmitted and how it can be prevented after reading and interviewing, (p. 92)
4. to report how the local people get potable water (p. 104)

The above four questions encourage problem solving process. But the question remains that how systematically teachers help students to do these exercises providing the rush towards content coverage and the other challenges we have been discussing until now.

4.5.2. Social Studies

Order of Presentation: Like in biology we first find long readings of facts and theories on the topics, interspersed by few questions[11] that require indirect approach to the topic, and finally a list of review questions.

Type of Exercise: There are two types of exercises constantly appearing in all the units. The first types of exercises are questions that can be answered indirectly from the presentation of the facts. The second types of exercises are review questions at the end of each unit largely dominated by closed ended questions: True or False, Matching and Choose the Best Answer. However, all questions/exercises are focused on pure recall or content memorization.

4.5.3. Physics

Order of Presentation: In all the units we first find long readings of facts and theories on the topics, interspersed by few indirect questions and finally a list of review questions.

Type of Exercise: Here in also there are three types of exercises constantly appearing in all the units. The first types of exercises are the 23 experiments typically on a 'cook book' approach. The second types of exercises are questions that can be answered indirectly from the presentation of the facts. The third types of exercises are review questions at the end of each unit, largely dominated by closed ended questions: True or False, Matching and Choose the Best Answer.

The text book is laden with too much technical words and concepts highly removed from the need of rural people and students. It is amazing to see a text book which asks to perform 23 experiments in a school without any laboratory or science kit. The discussion time on electricity and electronics could have been transferred for other levels leaving the time for more relevant and contextual subject.

4.5.4. Chemistry

Order of Presentation: Like the previous subjects in Chemistry also we first find long readings of facts and theories on the topics, interspersed by few indirect questions and finally a list of review questions.

Type of Exercise: Here in also there are three types of exercises constantly appearing in all the units. The first types of exercises are the 33 experiments typically on a 'cook book'[12] approach. The second types of exercises are questions that can be answered indirectly from the presentation of the facts. The third types of exercises are review questions at the end of each unit, largely dominated by closed ended questions: True or False, Matching and Choose the Best Answer.

[12] Cook book approach in experiment is the listing of every procedure in the process of the experiment and finally indicating what comes out at the end of the procedures. It doesn't require higher order thinking; rather makes students mechanical.

Again like in physics text book, this is also laden with too much technical words and concepts highly removed from the need of rural people and students. It is again unfair to ask students to perform 33 experiments in a school without any laboratory or science kit.

Actually there are about five project works given in the text and one can judge again how relevant and practical they are in the rural areas. The projects ask to:

- write the acidic oxides found in their localities and how they are formed and later to discuss the report in the class,
- to interview experts or glean from books and prepare a report on how sodium bicarbonate dumps fire,
- collect different rocks in their locality and test them with lemon
- collect information on how charcoal is made,
- collect information how nitrogen is converted into nitrate.

General note on all text books:

The reviews of all the text books show that they have some common characteristics;

- The text books are much similar in their approaches to content and exercise presentation to the text books used in the old educational system.
- It is also easy to see that they don't have horizontal integration. They all compete, all in their own ways, for the little extra time and energy students have in doing exercises and projects.
- The contents are too theoretical in the absence of necessary school facilities and budget. All the text books, except biology, in a way are meant for preparation to the next higher classes and urban life.

4.5. The Road Map to the Future

The last question forwarded to teachers was what they think should be done in the future if the problem solving approach has to be implemented in rural primary schools. The following table illustrates the trend in teachers thinking:

Table 31. Teachers' recommendations of what must be done to implement problem solving approach

	What should be done in order to implement problem solving approach in rural primary schools' classroom instructions?	Frequency of response
	Assigning well trained teachers/ provide in-service training (enough and series of training) Conducting work-shops (with justice) then monitoring/assisting the implementation	47
	Preparing enough classroom facilities (library, laboratory and learning aids	27
	Development and provision of appropriate and sufficient books and text books (problem centered text books)	18
	Cultivating good character (moral) and participation among students (Eliminating misconceptions of democracy among students)	13
	Appropriate class size	9
	Free and democratic educational process cognizant of teachers rights	7
	Good school and political administration	5
	Better economy/budget	4
	Changing the educational strategy (educating less people with more quality)	4
	Implementing the policy properly (and not changing it from time to time,	4
	Putting in place a practical/realistic rewarding system to teachers and students	3
	To support classroom instructions with researches and practical works	3
	The teacher's self-esteem must be maintained.	3
	The government and the educated people must work together.	3
	Participating the teacher at all levels of policy making and implementation	2
	Self-contained class has to be stopped because it is limiting students capacity with only the capacity of the particular teacher	2
	Avoid discrimination based on sex and language	2
	Organizing college teachers so that they can travel to all places	2
	We must be able to feed ourselves first before anything else	1
	Increase the awareness about PSA.	1
	Supplying schools with manuals on teaching method (and helping them to study it)	1[13]
	Continuous consultation on the problems and solutions	1
	No Response	7

As indicated in the table, the recommendations are highly varied in their range and depth. However since education is a system, embracing a number of components, steps to improve one component triggers an improvement in the other component too. At the same time in order to build a strong and functional system we know that all the component parts have to be addressed. If the necessary tools and process can be availed with relative easiness simultaneously, it would make the implementation of the education policy faster and complete.

[13] This is an impressive suggestion therefore I have included it in my recommendation with a little elaboration.

If we try to create a hierarchy of the recommendations we will find that a lot have to be done in the following component areas if we want to have a problem solving citizen:

1. Good governance
2. Practical and broad based policy
3. Relevant and viable curriculum
4. Efficient and continuous teachers training and professional development
5. Good school administration
6. Enough school facilities
7. Support to the instructional process
8. Students with good moral foundations
9. Innovative instructions

Below is a model showing how one recommendation embraces the other:

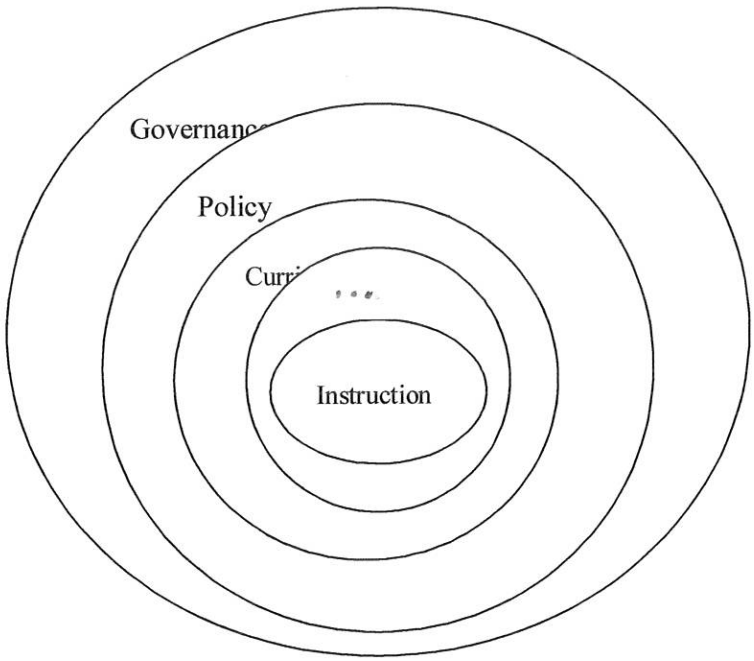

Figure 3. A model representing the hierarchy of recommendations

Chapter Five

5. Summary, Conclusion and Recommendations

5.1. Summary of Findings and Conclusion

A highly emphasized aspect of the Ethiopian education and training policy is the need to implement a problem solving approach in classroom instructions with the idea of producing a citizen with high problem solving ability. One decade has expired since the making of the policy and it is time to see whether such aspiration of the policy is being implemented at least at primary school level.

This particular case study had, as its starting point, stated that in fact problem solving approach/process are teachable and the capacity to solve problems can be developed in school children. Therefore it set out to find out if the problem solving approach is being implemented in rural primary schools.

The study took classroom observations as central to the data collection process. However, in order to increase the validity of the research and with the intention of describing more what has been taking place in the classroom interactions, the main elements of the interactions have been identified and used as source of data. These main elements included; teachers, students, principals, text books and school facilities. The sampling procedure and instruments of data collection were such that each category of elements is represented in a way they balance representation and depth and detail.

Though our daily life is full of problem solving, the scientifically accepted steps/process of problem solving approach were identified and their implementation was assessed in a way applicable to each source of data.

Accordingly the data obtained from each source with the particular instrument of data collection were organized and analyzed under certain themes pertinent to the process of problem solving.

In this respect the first issue raised and discussed was what the profile of the schools, the teachers and the students look like that make them favorable in the implementation of problem solving approach.

It has been demonstrated that schools in rural areas are in a devastated state in their physical structure and curricular aspects. The warm and dry weather coupled with shortage of water and other resources make rural schools of the Sample woreda a difficult place for teachers to teach and students to learn. However viewed from problem solving approach such challenges provide the background and context for its implementation. So in a way the problems affecting rural schools are blessing in disguise that make the implementation of problem solving approach urgent and contextual.

Teachers in rural schools have no enough training on problem solving approach and they are not also assigned at the appropriate grade level where their certification allows them to teach. The large proportion of teachers/students ratio and the short duration of one period do not allow individualized instruction. Lack of laboratories, the ineffective utilization of science kits, the absence of well functioning pedagogical centers and the absence of libraries pause great challenges to teachers in their effort to implement the approach. The students, though male dominated, are mature enough to be instructed by the approach. They sense the problems of their schools and locality and show the will to solve them.

Classroom observations didn't show any kind of instruction taking place using the problem solving approach. Teachers don't carry out much activity that makes students shoulder the responsibility of learning. As a result, the knowledge of rural primary school children in relation to the process of problem solving does not make them problem solving citizens. An encouraging observation made in the study is the positive attitude of rural primary school children to live and work among their rural families.

It has also been observed that a lot remains to be done to help teachers and principals understand and practice the problem solving approach mentioned in the education and

training policy. The cluster organizations and the Woreda education officials can provide a great help in this respect.

The provision of a policy and the steps taken by the government towards the creation of a problem solving citizen present an opportunity for those who feel the brunt of the poverty of the rural people. It could be a center around which all educators contribute their efforts.

Creating conducive economic, social and political environment for teachers and principals, the provision of quality pre and in service training to teachers, the availability of enough budget to schools facilitate greatly the implementation of problem solving approach.

Right now the study show that rural primary schools are under the gnawing influence of the vicious circle of poverty and low quality education. Therefore, stated in a very general sense, one can conclude that the implementation of problem solving approach in rural primary schools (of the sample Woreda) is in non-existent. By extension of the implication of the process to the end, one also can say that primary school leaver in the Woreda didn't have the capacity of problem solving. Students rather are found to develop dependency syndrome and highly influenced by the information they acquire from sources other than their formal education.

5.2. Recommendations

Almost all the schools in rural areas are primary-schools and a large number of the work force in the rural area is those students who spent only a few years at school. Based on this there is a need to reorganize rural primary schools specifically for the implementation of problem solving approach (which may require problems to be the basis of our learning). The implementation of problem solving approach requires a shift in many aspects of our educational system.

Observations have proved that such changes need to start from reexamining the old mental models many of us had about curriculum and instruction. This is because first of all many of the people that are at present the flesh and blood of the educational system were themselves instructed in the most traditional lecture form. Students in the schools also still consider the teacher as the only source and disseminator of knowledge. Most parents too consider the traditional methods of learning as true learning. It is against this background that the over all reforms need to be implemented; if we want our children to develop the capacity of problem solving.

Below few measures have been mentioned that can be taken in order to realize the implementation of problem solving approach in rural primary schools based on the study:

Whatever can be done in our educational system can only be done in the framework of the general policy. So the policy has to get a popular support among teachers. Therefore there should be a wider access and diffusion of the policy. Discussions on the policy need to be encouraged both at training institution and cluster levels.

The instruction of students with the problem solving approach should not be necessarily associated with classrooms. The instruction could be done in the fields and under tree shades. Moreover the students can be divided into groups. When one group is given the chance to discuss things in the class the other group can be sent to the field with clear mission (exercise) in the context of problem solving approach. The roles change to the groups from time to time.

Many of the challenges and problems facing rural primary schools could themselves be a source of inspiration to learn more and do something about them. The problem solving approach could base itself on the local problems and so the learning process becomes problem based. The experts could be their own parents; teachers facilitating the dialogue and interaction between students and parents. By doing so we create a forum by which enculturation occurs and indigenous knowledge studied and developed. Moreover this process assuages the accusation that extensive (solid) theoretical science is being given to pupils who live in rural and semi-rural areas where it is needed little.

Problem based learning is a delivery system that recognizes the need to develop problem solving skills. It utilizes real world problems, not hypothetical case studies. It assumes that it is in the process of struggling with actual problems that students learn both content and critical thinking skills. It also emphasizes the identification of key concepts related with key problems.

Based on this, text books also need to be rewritten in such a way that they help or guide the teachers in their facilitation of problem solving approach. Such rewriting needs to follow the suggested problem based learning, not the traditional subjects based learning.

As observed in the schools there is no enough time to implement student centered approaches. The 40 minute (one period approach) should be reexamined at least for two reasons: the implementation of problem solving approach requires a longer teacher student contact, and if we are to teach an integrated subject, in place of different subjects totally unrelated to each other, it is the topic under consideration that determines the wise allocation of time. Of course schools do not have enough time or resources to deal with every possible topic. We need to decide what things or concepts (which problems) are important and then focus our school energies to do them well. Content coverage should in no way be the primary focus of the learning process.

With the reorganization of the learning experience, changes in the methods of assessment become imperative. There is little incentive for changing instructional strategies and classroom organization to emphasize high-level cognitive learning and problem solving if national, regional and school wide assessments continue to evaluate the recall of facts. Students' performance in the field, their ability to gather pertinent data, their capacity to analyze the data and the motivation to act based on findings should be the criteria for evaluation. The alternative approach to assessment should also consider engagement of the student's mind rather than completion of tasks.

Teachers, as the most important factor in implementing the approach, need to be empowered to facilitate, rather than direct, problem based learning. They must be trained

in such a way that they assist students at each step of the problem solving process. Teachers themselves must be able to view problems as a challenge and believe in their own ability to solve problems.

Supplementary materials, beside the formal text books, could also be prepared for teachers. A comprehensive teaching methods manual, news bulletins and journals could be disseminated to clusters. Teachers in rural schools have time to read (they don't have anywhere to go in their spare time). This effort could be supported by students in tertiary levels by way of creating nexus between education and development.

Last but not least, a capability based moral education program must be given in schools in order to equip students with the rigor and honesty needed in the process of instruction with problem solving approach. Illumined by universal human values, free from bigotry and superstition, systematic studies would elucidate the nature of desired moral capabilities and their component qualities, attitudes, skills and concepts. Through scientific research and experimentation, educational contents and methods would then be discovered to help develop these components at various stages of individual growth. It could be included as an extracurricular activity before it is taken as a full fledged program.

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Appendix One

Tables Showing Detailed Responses of Teachers and Students

Table 1. List of methods teachers use to teach their students in the class

	Methods teachers use to deliver their subject in the class (listed from the most frequently to the less frequently used)	Teachers who ranked the method			
		1st	2nd	3rd	> 4th
	Lecture	70	24	12	7
	Discussion	38	27	15	10
	Review questions	15	3	-	3
	Group work	13	15	21	18
	Demonstration	5	12	12	3
	Question and answer	3	45	15	9
	Using learning aids	3	6	6	9
	Class work		3	6	2
	Field visit		3	-	5
	By letting students hear		3	-	-
	Home work			9	3
	Project			6	4
	Giving notes				9
	Checking exercise books				5
	Observation				5
	Practice				5
	Summarization				5
	Games and songs				1
	No response	5			

Table 2. List of the ways teachers encourage their students.

	Response Items	Frequency of response
	Speaking positive words like 'very good', 'good'	42
	Providing awards	21
	Letting them (encouraging) to have a vision of a better future	16
	Encouraging them not to drop out	12
	Urging them to increase their participation with courage	10
	Giving make up	10
	Asking other students to clap for the brave students	8
	Telling them to avoid fear of failure	4
	Answering their questions	3
	Informing how to study	3
	Encouraging them to be productive (and explaining our backwardness is due to lack of education and hard work)	3
	Giving class work	2
	Furnishing what they lack	2
	Writing letters of encouragement	2
	Doing justice in their grading	2
	Discouraging absence, gambling…	2
	Encouraging them to be good readers	2
	Talking to their families	2
	No response	10

Table 3. List of students' responses on the type of methods they use to gather data.

	Response Items	Frequency of response
	Discussing about the problem and get idea from people	15
	Radio, Leaflets (could be just one of them)/ Ethiopian radio	12
	Asking educated people	7
	Go and visit the area	4
	Asking the government	3
	To prepare plan and execute	3
	Asking information from students	2
	Asking the farmers	2
	Visit environmental protection office	1
	To talk to the women separately	1
	To go to the person who faced the problem and get information	1
	Unrelated Responses*	94
	No response	21

Table 4. List of activities students performed while they were taken to the field

	Response Items	Frequency of response
	Observed animals and birds of the area (around the lakes)	17
	We visited caustic soda	16
	Understanding the place	2
	To record what we observed and report.	1
	We tried to see things out side of our class by our own selves	1
	We did nothing	1
	Unrelated answer (biology, chemistry)	19
	No response	109

Table 5. Teachers' responses on the type of assignments they give to students

	Response Items	Frequency of response
	Exercises from the text books	78
	Group work and reporting the discussion	25
	Project work	15
	Reading assignments	7
	Sending them to the nearby offices/fields to visit and report	5
	That forces them to do some researches	5
	Sending them to ask from people	3
	Asking them to apply their knowledge for new situations	2
	To prepare learning aids	1
	No response	17

Table 6. Teachers' reasons in response to whether there is understanding of the problem solving approach in the education policy or not

Response Items	Frequency of response
Yes	
Because the policy helps to solve problems with tact and patience	8
Because the lesson is contextual and student centered	5
However the policy and the implementing ground are not compatible	5
Because the teacher is implementing the policy	5
Teachers are clear about the policy but not students	4
Because we have enough guidance from MOE	3
Because there are group discussions	3
Poverty	3
Because of the in service training the teachers get	2
The training has introduced us with the new ETP	1
No response (out of those who said 'yes')	11
No	
Lack of (adequate training) on the approach/policy (particularly those who were trained before this policy)	46
The policy itself is not problem solver / full of conflicts (changes from time to time, prepared by another body, teachers are confused about it,	12
Lack of facilities (constraint exist to implement the approach)	7
Even if there is understanding it is very difficult to practice it	6
The status of teachers is low. They are not favored sector of the society. They lead miserable life. They themselves need someone who will solve their problems.	6
Lack of budget for any activity	5
Lack of awareness on the new ETP (because the making is top-down approach)	4
We heavily depend on text books (where there is no PSA)	4
All teachers didn't understand it equally	3
Because the criteria for recruiting and assigning teachers is their ability to speak Oromifa not the understanding of the policy	3
The content of the education is corrupt and itself problem creator	2
Problems in the training of teachers in the institutes (limitation of time, insufficient explanation…)	1
Large class size	1
No response (Out of those who said 'no')	3

Table 7 List of responses concerning whether problem solving approach is being implemented regardless of the understanding or not.

	Response Items	Frequency of response
	No	
	Lack of adequate teachers training and awareness (even if they want to implement it)	28
	The inconvenience because of high number of students The innovations in the policy doesn't correspond with the class size	16
	Our poverty (low economy) doesn't enable us to implement it	12
	Lack of willingness to practice it	8
	Many of the guidelines are 'impositions' on the teacher	7
	I didn't understand what problem solving education itself mean	7
	Teachers are trained in different systems/policy	4
	The high load on the teacher (30peroid/week)	4
	Lack of acceptance by the people	4
	The implementation of programs is not incremental. It is so fast and at once that there was no time for teachers understand the process	3
	Lack of participation of teachers in policy making	1
	Of course we are trying to practice student-centered approach but it is not problem solver	1
	No response 'out of those who said 'no'	5
	Yes	
	Though not effective, it is being practiced	13
	Teachers are trying to solve some problems	7
	Because we are applying student centered approach	3
	Because of the teachers interest to implement the policy	3
	Because there is vocational education at higher levels	2
	It is the government's policy so we have to implement it	2
	Because this approach is being used at all educational levels	2
	Because of the different workshops being conducted	1
	The text book, the training of teachers, group work and reporting …all these help problem solving approach	1
	No response 'out of those who said 'yes'	13

Table 8 Some of the reasons why students want to stay around their parents in the rural area.

	Response Items	Frequency of response
	To solve the problem of my family and the society	25
	To educate the people modern ideas (on agriculture)	21
	Because I come/belong from the rural area	4
	To be a model for the people (in good/modern farming) & family life	3
	To protect animals and plants	2
	If I am not addressing the problem who else does?!	2
	I want to have personal feel of their problem	1
	To identify the problems of the area and solve it	1
	To live with the people in my locality	1
	Because we have to work	1
	I will educate my family and help them to come to town	1
	No response	23

Table 9. Some of the reasons why students don't want to stay around parents in the rural area.

Response Items	Frequency of response
Rural area has a lot of problems and backwardness while city life is good (no road, no health facility…)	14
I better stay in town (improve myself) and help my family to be like me (to come to town)	11
Because employment is secured in town.	3
I want to travel out of Ethiopia	2
Because I will start to live where I am assigned to work	2
I will bring my family to town	2
Because a learned person cannot stay in a rural area	1
I feel bad to return to family once I finished school	1
To continue further education and improve my living condition	1
I will go to a different place to teach the people	1
No response	12

Table 10. Some of the responses students provided as to whom they think will solve the problems of their parents and their locality if they don't want to stay in the rural areas.

Response Items	Frequency Of response
Myself (sometimes going back to the rural area, Ourselves…	15
The government (the federal)[Error! Bookmark not defined.]	13
The people themselves	11
Kebele committee/ Woreda officials	7
My family	3
The concerned body	3
I will myself solve it after I improved/educated myself	3
Children who are abundant in the rural areas	2
Those who learned earlier	1
Chairman of the Kebele	1
The people themselves, as it is said 'it is only when a victim cries that a neighbor arrives for help '	1
No response (out of those who responded 'no'	15

Table 11. List of the type of training teachers said they got

	Response Items	Frequency of response
	How to make student centered lesson	7
	How to use the book prepared by Rift Valley[1]	5
	The training is on how to lecture, not how to solve problem	5
	Learning in groups	3
	Teaching methods as a whole	3
	Continuous assessment	2
	Special needs in education	2
	About the new education policy	2
	Proper punishment	2
	Students and teachers role in becoming problem solver	1
	Preparing local learning aids	1
	Not response out of those who claimed to have training	5

[1] This a book prepared by a non-governmental organization called Rift Valley which works on the area of education. It has developed its own materials and some teachers are trained on how to use it as a supplementary material at lower levels.

Appendix Two

List of sample schools included in the study

Table 1. showing the list of sample schools included in the study

No.	Name of the Primary School	Students			Teachers			Remark
		M	F	Total	M	F	Total	
1	Abosa	719	465	1184	6	11	17	
2	Adami Tulu	1593	1172	2765	16	20	36	
3	Adami Tulu Dombosco Catholic	217	199	416	11	2	13	
4	Batu Number One	2265	2109	4374	23	29	52	
5	Batu Nubmer Three	814	553	1367	18	3	21	
6	Bulbula	2316	1334	3650	20	6	26	
7	Jido	985	479	1464	9	5	14	
8	Woransa	784	445	1229	7	6	13	
	Grand Total	**9693**	**6756**	**16449**	**110**	**82**	**192**	

Source: Adami Tulu Jido Kombolcha Woreda Education Desk statistics office (2004)

Appendix Three

Classroom Observation Checklist

Addis Ababa University - College of Education

Classroom Observation Checklist (supported by the recording of major steps in the process of instruction)

I. General

1. Woreda: _____ 2. School: _____

3. Grade: _____ 4. Subject (being observed): _____

5. Number of students in the class: _____ Male _____ Female_____

6. Sitting arrangement (Circular, U-shaped, Traditional …) _____

II. The teacher:

1. Outward appearance:_____ 2. Qualification: _____
3. Experience as a teacher: _____

III. Lesson Plan

1. Is it timely? _____ 2. Is it checked by superiors? _____
3. Is it in a project format? _____

IV. Details in Classroom instruction

No.	Observation Items	Remark
	I. The Teacher	
1	Asks questions to determine prior knowledge	
2	Asks open-ended questions	
3	Average wait time to let students think on questions	
4	Asks if students have brought problems	
5	Proposes problems of his/her own creation	
6	Discusses local problems	
7	Discusses how to identify problems	
8	Demonstrates strategies to solve problems	
9	Encourage students to give their hypothesis	
10	Appears as partner in the process of inquiry	
11	Expresses ideas clearly	
12	Uses learning aids	
13	Gives opportunity to students to share ideas	
14	Listens intently when students speak	
15	Demonstrates enthusiasm when teaching	
16	Encourages students	
17	Gives exercises/projects	
18	Uses chalk and talk method	

19	Uses other methods than chalk and talk method	
20	Gives group work	
21	Discusses criteria/ways to evaluate one's hypothesis	
	II. The Students	
1	Ask questions (how many students asked question?*)	*
2	Share ideas openly (how many?*)	*
3	Mention problems	
4	Propose strategies to solve problems	
5	Discussed criteria to evaluate hypothesis	
6	Level of participation (how many students how many times?*	*
7	Follow lessons enthusiastically	
8	Have say in determining the method of instruction	
9	Make guesses to questions	
10	Are afraid to make mistakes	
	III. The Classroom	
1	Ventilated enough	
2	Has enough space for free movement	
3	Accommodates different kinds of sitting arrangement	
4	Has enough chairs and desks	
5	Chairs and desks are comfortable	
6	Is neat (clean)	
	IV. The Lesson	
1	Relevant to the locality	
2	Relevant to the students' need	
3	Captures students' attention	
4	Method and content correspond	
5	Raises problematic issues in the topic and triggers students thinking	
6	Encourages observation and experimentation	
7	Asks to report findings	

Additional Comments:

Appendix Four

Questionnaire for Students

Addis Ababa University
College of Education, Department of Curriculum and Instruction

Questionnaire for Students

Part I. General Information about the Respondent

1. Sex: Male _____ Female _____

2. Age _____ 3. Which kebele are you living: _____

4. Are you living with your parents?
   A. Yes B. No C. other _____

Part II – Problem and Problem Solving Process

Whenever choices are given to questions, please circle the answer you think most suit your thinking. Whenever you have a different opinion than the choices listed, please write your comments briefly on the given blank spaces.

5. What are the different problems in your locality? (Please list them in order of severity: the most severe first, the less severe next, so on.)

_____
_____
_____
_____
_____

6. What methods do you use to gather information on the problems?

_____
_____
_____
_____
_____

7. Do you think you can solve the problems you listed above?
   a. Yes b. No c. other comment _____

8. If you answer 'Yes' to question 7, would you please list the procedures you can follow or apply in solving any one of the problem?

_____
_____
_____
_____

9. If there are many solution paths to solve a problem how do you choose the best one?

_____
_____
_____
_____

10. Do you bring and discuss the problems of your community in the classroom?
    a. Yes b. No c. other comment _____

11. If you answered 'yes' to question 10, what kinds of problems do you bring to the class and discuss?

_____
_____
_____
_____
_____
_____

12. Do you try to apply what you have learned in school to solve the problems of your locality?
    a. Yes b. No c. other comment _____

13. If you said 'yes' to question 12, how do you apply them? Or if you said 'no' what are the challenges not to apply them?

_____
_____
_____
_____
_____
_____

14. How frequently your teachers take you to the field to visit and observe things?
    a. always b. sometimes c. never d. other comment _____

15. If you answer 'always' or 'sometimes' what are the things you did in the field (Please mention for which subject)?

_____
_____
_____
_____
_____
_____

16. If you answered question 15, did you report about it in the class?
    a. Yes b. No c. other comment _____

17. How frequently your teachers show you something and ask you questions about it?
    a. always b. sometimes c. never d. other comment _____

18. Do your teachers encourage you to ask questions?
    a. Yes b. No c. other comment _____

19. What are some of the methods your teachers use to teach you their subject?

20. Would you like to live in the rural area where your parents live after you finished school?
    a. Yes b. No c. other comment _____

21. If you answered "yes" to question 20, why do you want to live there?

22. If you answered "no" to question 20, what are your reasons?

23. If you answered "no" to question 20, whom do you think will solve the problems of your parents and your locality?

24. What are the things that you want to learn in schools?

25. A certain rural locality faces different kinds of disease more than other localities. If the people approach and ask you to solve these disease problems what are the steps that you take to solve these problems?

26. Another rural locality had water shortage. If the people approach and ask you to solve the water shortage problem what are the steps that you take?

Appendix Five

Questionnaire for Teachers

Addis Ababa University
College of Education, Department of Curriculum and Instruction

Questionnaire for Teachers

Highly esteemed teacher,
First of all I would like to thank you for your willingness to fill this questionnaire. This study is concerned on the implementation of the problem-solving approach so advocated in the Education and Training Policy. Any response given in the questionnaire is used only and only for the purpose of research. And it remains confidential. The questionnaire is also by no means an evaluation of the teacher so I humbly request you to give a true and precise response.
May God bless you!

Instruction: Whenever choices are given to questions, pleas circle one that most fits your position. Write your comments freely in the provided blank spaces whenever you are asked to give your comments.

Part I. General Information about the Respondent

1. Sex: Male _____ Female _____

2. Age _____

3. Highest certificate awarded: _____

4. Which teachers' training institution did you attend: _____

5. How many years of teaching experience do you have? _____

6. Which subject are you teaching? _____

7. Which level are you teaching?

   Primary First Cycle (1-4) ☐ Primary Second Cycle (5-8) ☐

   Secondary First Cycle (9-10) ☐ Secondary Second Cycle (11-12) ☐

8. How do you rate your interest in teaching profession?
   a. Very High b. High c. Medium d. Low e. Very low f. other_____

9. How do you rate your love to the subject you teach?
   a. Very High b. High c. Medium d. Low e. Very low f. other_____

Part II – Problem and Problem Solving Process

1. Do you think the Problem Solving Approach suggested in the Education and Training Policy is understood well by the teachers?
   A. Yes B. No C. Other suggestion _____

2. Would you please list some of your reasons for your answer to question 1:
   _____
   _____
   _____
   _____
   _____
   _____

3. Do you say that problem solving approach is being implemented in your school regardless of the extent of the awareness?
   A. Yes B. No C. Other suggestion _____

4. Would you please list some of the reasons for your answer to question 3:
   _____
   _____
   _____
   _____
   _____
   _____

5. Do you remember the discussion of any problem and problem solving process in the text book or teachers' guide you use to teach students?
   A. Yes B. No C. Other suggestion: _____

6. If you answered "Yes" to question 5 can you mention which part of the text book or the teachers guide you mean?
   _____
   _____
   _____
   _____
   _____
   _____

7. Is there any support by outside sources to assist you to use problem solving approach in your instruction of your subject?
   A. Yes B. No C. Other suggestion: _____

8. If you answered "Yes" to question 7 would you please mention who assisted you and the manner of the assistance?
   _____
   _____
   _____
   _____
   _____
   _____

9. Would you please list the problems that you think exist in the locality where your school is located? (Please list them in order of severity: the most severe first, the less severe next, so on.)

_____
_____
_____
_____
_____
_____

10. Do you believe that students are being equipped with the necessary knowledge and skill to solve these problems?
    A. Yes B. No C. Other suggestion: _____

11. Would you pleas give reasons why you answered "Yes" or "No" for question 10?

_____
_____
_____
_____
_____
_____

12. Would you please list the ways education can contribute to solve the problems of rural community?

_____
_____
_____
_____
_____

13. Have you got any training on the instruction of students with problem solving approach?
    A. Yes B. No c. other suggestion: _____

14. If your answer to question 13 is "Yes" where did you get the training?

_____
_____
_____

15. If you answered question 14 would you please specify the type of training?

_____
_____
_____

16. If your answer to question 13 is 'yes' how do you rate the helpfulness of the training in instructing students with the problem solving approach?
    a. Very High b. High c. Medium d. Low e. Very low

17. If you didn't get any training, how does this affect your capacity to instruct students with problem solving approach?
a. It affected me very highly. b. It affected me highly. c. It affected me moderately d. It affected me little. e. It hasn't affected me in any way and I am using the approach
f. I have never wanted to use the approach so I didn't feel the problem g. Other suggestion: No any training on PSA however we are trying to teach the way we understood it.

18. If your school is organized under cluster center, what kinds of advantage do you get out of?

_____
_____
_____

19. Do you use problem solving approach when teaching your subject?
A. Yes B. No Other comment _____

20. If you say 'yes' to question 19 how are you using it?

_____
_____
_____
_____

21. If you say 'no' to question 19 why aren't you using it?

_____
_____
_____

22. How do you rate the readiness of schools to equip students with problem solving capacity?
a. Very High b. High c. Medium d. Low e. Very low

23. If your answer is "Very High" or "High" to question 22, what are your reasons to answer that?

_____
_____
_____
_____
_____

24. If your answer is "Medium" or "Low" or "Very Low" to question no. 22 what are your reasons to answer that?

_____
_____
_____
_____

25. What other methods do you use to deliver your subject in the class? (Please list them from the most frequently to the less frequently used)

_____
_____
_____
_____

26. Do you give home-take assignments to students?
A. Yes B. No Other comment _____

27. If your answer to question 26 is 'yes' what are the type of assignments you give to the students?

_____
_____
_____
_____

28. Is it possible to implement teaching methods that involve students actively in the learning process in the context of rural schools?
A. Yes B. No Other comment _____

29. Whatever your answer to question 28 is, would you please give your reasons why you answered that?

_____
_____
_____
_____
_____

30. How do you rate the capacity of students who completed 8th grade and live in the rural area to solve the problems of their locality?
a. Very High b. High c. Medium d. Low e. Very low

31. Can you briefly describe why you answered your choice for question 30?

_____
_____
_____
_____

32. Do you encourage your students?
A. Yes B. No Other comment _____

33. If you answered 'yes' to question 32, what are the ways you encourage students?

_____
_____
_____
_____

34. What do you feel should be done to practice problem solving approach in classroom instructions?

_____
_____
_____
_____

Thank you again!!!!!!!!!!

Appendix Six

Out of Classroom Observation Checklist

Addis Ababa University
School of Graduate Studies

Out of Classroom Observation Checklist (Pedagogical Center, Laboratories, Libraries)

1. **Pedagogical center**
   a. Is there a pedagogical center? Yes No
   b. If 'yes' how is it organized?
      1 Does it have enough facility?
      2. Does it have expert support?
      3. Does it have programs to students for hands-on activities?
      4. Is it being used effectively by teachers?
      5. Is it being used effectively by students?
      6. Is it helping the problem solving approach?
   c. If 'no' why doesn't it exist?
      1. Is there any effort to establish it?
      2. What obstacles did you face in establishing it?

2. **Laboratory**
   a. Is there a laboratory? Yes No
   b. If 'yes' how is it organized?
      1. Does it have enough facility(space, chemicals, water, apparatus, manuals …)?
      2. Does it have expert support (lab assistant)?
      3. Does it have programs to students for hands-on activities?
      4. Is it being used effectively by teachers?
      5. Is it being used effectively by students?
      6. Is it helping the problem solving approach?
   c. If 'no' why doesn't it exist?
      7. Is there any effort to establish it?
      8. What obstacles did you face in establishing it?
      9. Is there laboratory kit?
      10. Is there someone trained in using lab kit"

3. **Library**
   a. Is there a library? Yes No
   b. If 'yes' how is it organized?
   c. If it exists does it have enough facility (space, books, table and chairs,…)?
   d. Does it have a librarian?
   e. Does it have programs to students for reading?
   f.. Is it being used effectively by teachers and students?
   g. Does it help the problem solving approach?
   h. If 'no' why doesn't it exist?
      - If 'no' is there any effort to establish it?

Appendix Seven

Interview Guide

I. Principals

A. What is your rating of the extent of understanding on the problem solving approach of the Education and Training Policy?

B. What is your reasons for the answer in Question A.

C. Is there any type of training on the approach? If yes what type of training is given and how?

D. How do you see the extent of the implementation of problem solving approach in your school?

E. Is there any kind of out side support to implement the problem solving approach of the ETP? Who, how and when if there is any support?

F. Is there any involvement of the school/students in solving the problems of the community?

G. How do you rate the capacity of eighth grade students to solve the problems of their locality?

H. What are the challenges in the implementation of problem solving approach?

I. What is the status of the budget in terms of realizing problem solving approach?

J. What do you recommend for future consideration?

Addis Ababa University
School of Graduate Studies

This thesis has been submitted for examination with my approval as a university advisor.

Name: Teshome Nekatibeb (Dr)

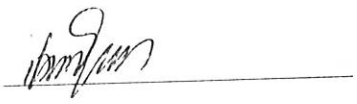
Signature: Teshome Nekatibeb

Date of Submission: JUNE 10, 2004

Declaration

This thesis is my original work; it has not been presented for degree in any other University and that all sources of material used for this thesis have been duly acknowledged.

Name: Solomon Belay

Signature: 

Place: Addis Ababa University

Date: June 2004